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ART. 64.—*Thoughts on the Changes and their Causes, which are perpetually occurring in Material Creation.* By CHARLES CALDWELL, M. D. Professor of the Institutes of Medicine, and Clinical Practice, in Transylvania University.—Read in the Lexington Medical Society. From the Transylvania Journal of Medicine, &c. [Continued from page 89.]

It would be easy to show, did time permit me to dwell on the subject, that, far from co-operating in the same scheme, and to the same purpose, chemistry and vitality are, as already intimated, the very opposites of each other; that they are, in the wise and beautiful economy of creation, antagonizing agents, related to each other as attraction and repulsion, or centripetal and centrifugal forces.

The province of vitality is to build up the world of living matter, and bestow on it the countless forms, beauties, and excellencies which it so abundantly exhibits. Chemistry, on the contrary, pulls down and demolishes these forms, resolves them into their original elements, and thus prepares them for new and different organizations, under the plastic and powerful influence of its antagonist. Hence, no sooner does life forsake an organized body, than chemistry invades it, makes it its own, and reduces it to earthly matter, or scatters it in air.

As relates to the vegetable kingdom, in our own climate, spring, summer, and a part of autumn, are the period in which vitality is busy in its operations. During this time it embellishes and enriches our plains and fields, and meadows, and gardens, with all that is gay and gorgeous in foliage and flowers, all that is delicious and valuable in fruit. But, with the last weeks of autumn, comes a frost, "a killing frost" which disrobes the vegetable kingdom of its beauties, and strews them on the ground. Now commence the orgies of chemistry, in the course of which, flowers, leaves, and stalks, with an abundance of fruit, are all disorganized, diffused through air, in the form of gas, or reduced to a loose, earthy, and unsightly mass, adapted to the further purposes of life. Thus, in the wise and beneficent economy of nature, do these two antagonizing powers reciprocate benefits, and contribute abundantly to each other's employment. Vitality constructs animal and vegetable forms, that chemistry may dissolve them; and chemistry dissolves, that vitality may reconstruct.

But, true and obedient to the ordinances of Heaven, these two powers never *in fact* invade each other's rightful province. It is only in the visionary system, and unfounded report of the "chemico-physiologist" that such invasion is alone to be found. Where vitality works, chemistry is idle; where the former speaks the latter is silent.

The oak and the gigantic Adansonia digitata live and flourish a thousand years, the pride of the forest. During this long patriarchal period, chemistry never attempts to molest them. They are monuments exclusively of the reign of vitality. But they die through age, or are overthrown by the tempest. Then do the workings of vitality in them cease. They become then the property and domain of chemistry, and are resolved by it into masses of vegetable mould.

Of animal nature the same is true. The elephant lives centuries, and some of the cetaceous tribes as long perhaps as the oak or the Adansonia. During this time they are above the reach of chemistry. But death at length overtakes them, and all the changes of vitality cease. They become now striking examples of the reign of chemistry. Instead of digestion, assimilation, nutrition and secretion, putrefaction is the only process they manifest. Such is the destiny of the entire world of animals and vegetables. Governed for a season by the principles of vitality, they fall, at last, under the dominion of chemistry, and pass into elements.

To render this case the more striking and conclusive, warm-blooded animals are in the very condition best calculated to invite putrefaction. Their temperature is suitable, and they have, in their systems, the proper mixture of solids and fluids. Still, while their economy is the result of vital principles, neither in health nor disease does putrefaction occur in them. In sphacelation, the parts putrefy only when their vitality is completely extinct.

Still further to evince the absolute opposition between vivality and chemistry, the former not unfrequently checks the latter in its course. A vulture, a hyena, or a famished wolf has feasted on putrid animal matter. In the course of an hour examine the half digested contents of its stomach, and you will

find them perfectly free from taint. Their offensive odour is gone, with every other phenomenon that speaks of putridity.

A snake has swallowed a rabbit, a squirrel, or some other small animal. Owing to the difficulty created by the hair of the animal, and its not being masticated it is digested slowly. From its being too large to be all contained, at once, in the stomach, or real digestive apparatus of the snake, a considerable portion of it remains in the gullet. Long before digestion is completed, that portion, which has not yet entered the stomach, and is not, therefore, subject to any vital process, becomes putrid. But, as soon as it makes its way into that organ, and receives the influence of its digestive function, its putrefactive taint is removed.

In these instances, the vital process of digestion takes an ascendency over the chemical process of putrefaction; an ascendency perfectly in the order of nature, the vital being confessedly the more elevated power. Other cases of a similar character might be easily cited.

Of those writers and teachers, who inculcate the hypothesis, that certain functions of the animal economy are performed by chemical agency alone, my notice shall be brief. The belief is so unreasonable, not to say absurd, that there are very few, at present, who make an open avowal of it. Some chemists do, indeed, still continue to talk and write about the chemical carbonation, decarbonation, and oxygenation of the blood, the superiority of the arterial to the venous blood, in its capacity for caloric, and the generation of heat, by the conversion of fluid into solid matter; and the reverse. All this they do, as they would induce us to believe, to instruct us in the production of animal temperature; to persuade us that it is, in some way, the result of chemical agency. But their handling of the matter is so miserably loose, misty, and without point, that it is impossible to determine, to which class of pseudo-inquirers they belong, the purely chemical, or the chemico-physiological; or whether, like a certain equivocal animal, the siren lacerta, they do not bear a kind of amphibious being, subsisting, by turns, on simple error, in one school, and compound absurdity, in the other.

To those chemists who may contend that any one of the functions of living matter is performed by means exclusively chemical, I beg leave to propound a few interrogatories.

Can you perform any one of those functions in your laboratory? Can you there convert common alimentary matter, well masticated and imbued with saliva, into chyme, the first step in the process of digestion? Can you convert chyme into chyle?—chyle into blood?—blood into muscle, tendon, or bone?—or can you form, from blood, bile, saliva, pancreatic juice, or any other secreted fluid? To each of these questions the answer of the chemist is necessarily, no. I continue my interrogatories. Here is a bone fractured, and a muscle divided by a cutting instrument. Can you, by chemistry, effect a reunion? Again I receive from him a negative answer. My reply to him is, then is your hypothesis unfounded and visionary, or you are uninstructed in the art you profess. You say that by chemical agency alone food is digestive, blood composed, and the processes of nutrition and secretion effected. You are, by reputation, a chemist; yet you are unable to perform, by your art, the simplest of those functions. The dilemma is thus prepared for you; and on one of its horns you must necessarily hang. Confess, then, that your theory is false, or yourself ignorant.

But, perhaps, you can succeed better, as relates to the functions of the vegetable kingdom. Let us try. Your chance shall be a fair one.

Can you, from the sap of the rosebush, produce the beauty and fragrance of its blossoms?—no—from the juice of the myrtle, the leaves and flowers, by which the plant is adorned?—no—from the sap of the pomegranate tree, the beautiful and fragrant fruit which it bears?—no—or can you, from the life-blood of the peach tree produce even the gum which oozes from its stock?—still is the answer no. What, then can you do, in the performance, by chemistry, of a single animal or vegetable function?—Literally, not an act—you can simply talk about it, and nothing more. You can deceive those, who are as ignorant of the functions and laws of vitality as yourself; and thus are your boasted pretensions interpreted; and here do your art and mystery end.

But, by way of a reciprocated puzzle, or for some other purpose about as valuable, I am asked in turn, what is to be understood by the term *vitality?* I answer, vitality is to be interpreted in the same way as chemistry. They are both abstract terms, each being the representative of a peculiar set of phenomena or changes, in the material world, governed, of course, by peculiar laws. The same is true of the word mechanics. It denotes, in like manner, an insulated and specific set of phenomena, governed by laws peculiar to themselves,

The word chemistry is the symbol of all the facts and phenomena that belong to that science, together with the causes, to which they are attributable, and the laws that control them.

So, in like manner, is vitality the symbol of all the peculiar facts and phenomena, observable in the economy of living organized matter, with a similar reference to their principles and laws. I need scarcely add, that the phenomena of chemical matter, strictly so called, are as different and distinct from those of

living matter, as are the phenomena of the mineral from those of the animal and vegetable kingdom. No enlightened and unprejudiced observer of nature will ever confound them.

But I am again, in the unprofitable spirit, not of solving difficulties, but of attempting to divert attention from one difficulty, by meeting it with another, asked, what is to be understood by the principles and laws of vitality; or, in simpler language, what those laws and principles are?

I answer, that in a paper, like the present, it is not permitted me to attempt an explanation of them. Such a disquisition could not be compassed within the limits, to which I must confine myself. To do it entire justice, a volume would be scarcely sufficient. But I fearlessly add, that they are as well settled in science, and as accurately understood, by the cultivated physiologist, as are those of chemistry by the votaries of that science, or those of mechanics by the natural philosopher. From the mere chemist, whose views are confined to his closet and his laboratory, and who has never made life and its functions his study, they are necessarily concealed. Nor, had he the least discretion, would he ever speak of them, either as an assertor or a denier of their existence; nor for the purpose of giving an exposition of them; in which case, he would escape the disgrace to himself, and the mortification to his friends, of exposing his ignorance, and perpetually burying himself in blunders with respect to them.

As connected with the present discussion, another topic, of no common interest, claims, for a moment, our serious attention.

It is asserted by some chemists, and perhaps by others who are not chemists, that out of a mass of matter, no substance can be produced, either simple or compound, which did not *formally* exist in that mass, possessed of all its peculiar qualities. That if, by a series of chemical processes, iron and sulphur can be extracted from the human blood, the fact amounts to proof incontestable, that iron, possessed of all its metallic, and sulphur, of its mineral properties, were actually and formally in the blood, as it circulated in its vessels, a living fluid. And that, if by the process of combustion, potash can be produced from a log of hickory, or maple, the potash must have existed *formally*, a constituent part of the log, marked by all its alkaline qualities.

If this opinion be not signalized by its absurdity, in the midst of opinions most absurd, then am I deceived in my views of it. Its chief advocates are the humoral pathologists, whose object is to prove, by it, that whatever substance can be extorted from the human blood or other fluids, even by the most complicated series of chemical experiments, existed necessarily, in its formal character, in the blood, as it circulated through the system, and in the other fluids, in their proper receptacles. Having an immediate bearing, then, as well on practical as scientific medicine, the hypothesis is peculiarly worthy of our consideration.

Before proceeding, further, in the illustration of this topic, let me here observe, that until subjected to the processes of decomposition, and recomposition, the one by combustion, and the other by the requisite chemical agents, wood exhibits no sign of alkalescency, nor blood of its holding, in its composition, either iron or sulphur. Of those two compounds, then, these substances are not the native products. They are the result, not of the functions of animals and vegetables, but of the chemical processes by which they are made manifest.

It has been already stated, that the rich and fragrant blossom of the lotus of the Nile, is formed exclusively out of the turbid waters and their slimy sediment of its parent river. But does it thence follow, that the exquisite fragrance, in its actual condition, and possessed of the qualities which render it so precious, pre-exists in those waters? Show me the humoralist who will answer in the affirmative.

The epidendrum aerium, with the beauty and delicious odour of its blossom, is fed and formed out of the atmosphere around it. But no one will contend that the odour pre-existed formally in that atmosphere in a latent state, awaiting the flower to take it up, set it at liberty, and render it sensible.

Some of the canes, with their rich and finely flavoured saccharine juices, are nourished and produced from the soil in which they grow, and others, as is believed, from the atmosphere alone. But no one imagines that those juices, in their formal state, have an actual existence either in the earth or the air. Such a hypothesis could prevail only within the walls of a mad-house.

Wine is prepared from the grape. The grape is prepared from the sap-juice of the vine, and that from the soil and atmosphere by which the vine is nourished. But who will have the wildness and hardihood to maintain, that the provinces of Champaigne and Burgundy, in France, contain in their soil and atmosphere, the racy and sparkling beverages to which they have given their names?

It has been already stated, that the sugar contained in some of the canes is formed from the atmosphere, and that in others, from the soil in which they grow. From sugar is produced, by a chemical process, the fluid called alkohol. But no chemical process can procure that fluid from either the earth or the atmosphere by which the canes are nourished. Nor has the spirit of hypothesis yet grown so rampant, as to contend that it *formally* exists in them.

Water is one of the deadliest foes of combustion,

and is, therefore, employed as among the most effectual means to extinguish it. Yet is that fluid compounded of two gases, one of them itself highly combustible, and the other the universal feeder of combustion; and both of them can be easily extracted from it. Will any philosopher, then, undertake to maintain that hydrogen and oxygen, in the full possession of all their properties, actually and formally exist in their compound called water? Folly itself will shrink from the absurdity of an affirmative reply. But I retract the expression. There is folly so consummate that it does not shrink from it. The reply has been virtually given in this place. I myself have been repeatedly the "wonder-wounded hearer" of it.

From two varieties or, perhaps, species, of the Peruvian bark are procured, by a chemical process, quinine and cinchonine, and from the bark of the cornus floridus, the article called cornine.

But I am far from being yet convinced, either that those substances exist formally in the barks, from which they are derived, or possess their native properties. On the contrary, my present persuasion is that they do not. They are chemical compositions, not native products.

If we extend our researches into the animal kingdom, we shall find there matter in abundance equally subversive of the hypothesis I am examining.

Chemists inform us that the muscle of an ox is composed chiefly of oxygen, hydrogen, azote, and carbon. But they will not hazard their reputation by contending, that, in that portion of solid flesh, when possessed of life, and performing the function of voluntary motion, either of those constituents exists, in its formal condition, characterized by its qualities as an elementary substance. Nor will they allege that the viper finds, in the simple fare, on which it subsists, its deadly poison already formed.

In like manner with that of the foregoing, the explanation of the following facts sets chemistry at defiance.

The effect of nitrate of silver, taken for some time internally, is to blacken the skin. The belief of chemico physiologists is, that this is the result of an impregnation of the blood by that metalic salt, and a deposition of it in the skin. Yet from the blood not a particle of it can be procured, by any process to which that fluid can be subjected. Nor is it found in the skin, to which it has imparted a dark colour. The effect arises from a change in the secretory action of the skin, produced sympathetically, by the direct action of the nitrate of silver on the mucous tissue of the stomach.

Put an individual, either in health or disease, on a course of sulphur, and, in a few weeks, so impregnated will be his perspiration, by that mineral, that it will blacken the silver which he carries in his pocket. Yet is there, now, no more sulphur *formally* in his blood, than at any other time. Nor, can any more be procured from it by chemical agency.

The same is true, as respects iron, after a long course of chalybeate medicine. None of that metal is *formally* in the blood; nor can it be extracted from it, in larger quantities, by means of chemistry, than in cases where no chalybeates have been taken.

In the milk of females, and in the perspiration and urine of every person, who have swallowed large quantities of asafœtida, garlic, or spirits of turpentine, the odour of those articles becomes strongly perceptible. But, in their blood, not the slightest degree of the odour exists. That fluid retains its natural smell.

The explanation of these phenomena, I say, sets all chemical laws at defiance. By the laws of vitality alone can it be effected. They prove incontestably, that, out of compound substances, may be formed many matters, which did not formally exist in them.

To this class of preposterous opinions belongs that which proclaims ice to be nothing but water in its *natural state*. And certainly an opinion *more* preposterous, the human intellect can scarcely imagine. Ice can indeed be formed out of water, and water out of ice. They are, therefore, convertible into each other. So is rich vegetable mould convertible into a cabbage stalk, and a cabbage stalk re-convertible into mould. A pig, by digestion, assimilation and nutrition, may be converted into a man, and a man, by the same process, into a pig. Yet they are not the same. Vegetable mould is neither the natural state of cabbage, nor cabbage of vegetable mould. Nor, although there are men as stupid as pigs, is a pig the natural state of a man. Yet as well may identity be predicated of them, as of ice and water.

According to the showing of chemists themselves, these two substances are, in a high degree, different from each other.

Water is a compound substance, consisting of certain given proportions of oxygen, hydrogen, and caloric. But it is a law of chemistry, of which many confirmatory illustrations might be adduced, that, by varying the proportions of elementary substances, you change essentially the nature of the compounds into which they enter.

Ice consists of oxygen and hydrogen, with a smaller proportion of caloric than water contains. It is, therefore, a compound substance essentially different from the water out of which it is formed. It is different in proportion to the inferior quantity of caloric it contains. Give to it the amount of caloric which exists in water, and you reduce it to water.

Are the proto-chloride and the deuto-chloride of mercury the same? We know they are not; nor does

any chemist so consider them. Why? Because they contain different proportions of chlorine. The former contains one part of that substance, while the latter contains two. Yet are they easily convertible into each other. Add to the proto-chloride another part of chlorine, and it becomes a deuto-chloride; subtract from the deuto-chloride one part of chlorine, and a proto-chloride is the product. As well, then, may a proto-chloride of mercury be pronounced the natural state of the deuto-chloride, as ice the natural state of water. Of this subject innumerable other illustrations might be adduced. And neither in the proto-chloride, nor the deuto-chloride of mercury does there exist either chloride or mercury in a *formal condition*. The simples are entirely lost in the compounds which they form.

Let me entreat the advocates of the opinion I am opposing, to recollect, for a moment, and seriously consider, how exceedingly limited and superficial is our knowledge of matter. We know of it nothing but its properties. Of its substance we are ignorant, and must for ever remain so, because we have no faculties adapted to the acquisition of a knowledge of substance. Speculations, as to the nature and character of that, as well as in relation to all essences and entities, are but empty visions, and to us transcendental.

Remove from matter all its properties, and, as concerns us, you extinguish it. Change the properties, and you change the matter. To us it is no longer the same, but different, according to the new properties bestowed on it. To illustrate this by examples.

Take from a piece of gold its figure, size, solidity, colour, ductility, and weight, and, to us, the gold has no existence. Take from a peach or a pomegranate, the same properties, together with its odour and sapidity, and the fruit is annihilated.

Give to a peach or a pomegranate the figure, size, solidity, colour, weight, sapidity, and odour of an apple or a pear, and you convert it into one or the other of those kinds of fruit.

Bestow on gold the solidity, weight, ductility, and colour of silver or lead, and silver or lead is the product of the change. Of every other kind of matter, the same is true. You annihilate or transmute it, according as you annul or change its properties. To us, essence, substance, and entity are but abstract terms; the mere symbols of our own conceptions, and nothing more. They represent nothing but an imaginary substratum of qualities, whose influence alone gives us a belief in the existence of that substratum. Remove or extinguish the qualities, and, to us, the substratum is also extinguished. Change the qualities, the substratum is changed.

Identity of property, then, constitutes, to us, identity of substance, and diversity of property, diversity of substance. If to this proposition an exception exists, the knowledge of it would be gratifying to me.

But in the fundamental properties of *solidity*, and *weight*, as well as in the less important ones of colour and texture, ice and water are essentially different. To pronounce them the same, then, is a palpable violation, at once, of reason and common sense. Both physically and chemically their difference is obvious. As consistently with truth may it be asserted that blood is the natural state of the muscle, or the sap-juice of the pear tree, of the pear into which it is converted, or the reverse, as that ice is the natural state of water. Finally, as well may it be contended, that oxygen and hydrogen, out of which water is formed, constitute the natural state of that fluid; or, that water constitutes the natural state of the two gases that form it. View the hypothesis as you may, it is infinitely preposterous. Yet is it gravely announced, by writers and teachers, as a chemical axiom.

Were it true, that in the mutations of matter, the product is always and necessarily identical with the substance, or mass of substances, out of which it is formed, the result would be inconceivably monstrous and ludicrous.

We, the inhabitants of the West and South, would be but masses of pork, hommany, and cabbage; our fellow citizens, of eastern and middle states, compounds of beef, flour, butter, and buck-wheat cakes; while the hardy and intrepid sons of New-England would be chemical compositions of cod-fish and molasses. The Englishman would be roast-beef and strong beer, the Irishman a huge and sound hearted potatoe suitably garnished with curds and whey, the Frenchman a mixture of bread and soupe-maigre, the Spaniard and the Portuguese an overgrown onion swimming in olive oil, and the Chinese and the Hindoo an aggregate of rice. Under such circumstances ancient fable would be perfectly beggared by existing reality.

Shall I be asked, whence it is, that, in the various mutations, which, in the economy of nature, matter sustains, the product is usually so exceedingly different from the substances out of which it is formed? I answer, I do not know.

I do know, however, that there are two processes in perpetual performance, by which the character of substances is essentially changed. These are *composition* and *decomposition*; the conversion of simples into compounds, and the reduction of compounds into their elementary parts. By those who speak the language of observation, it will not be denied, that, in entering into composition, elementary substances lay aside the properties which they possessed, as simples; and that they resume them, as soon as the

composition is dissolved. In sound philosophy this is recognized as a law of nature. It will be observed that, in speaking of "simples," I use the common phraseology of the day, without vouching that the substances, so denominated, are simples. It is sufficient for my purpose that they are *comparatively* so; being more simple than the masses which they help to constitute.

Thus, when sulphur and oxygen unite in the formation of sulphuric acid, they both put off their specific characters. The compound contains neither real sulphur, nor real oxygen. The former has lost its combustibility, and the latter its capacity to sustain combustion, and support animal life. Decompose the acid, and its elements resume their properties, as simples. The sulphur is again combustible, and the oxygen respirable.

When iron unites with oxygen, to form an oxide, the mutation is of the same description. The iron loses its metallic character; is neither lustrous, malleable, nor of its own specific gravity; nor does the oxygen retain its properties as a simple. In the oxide of iron no real iron exists. Decompose the oxide, and its elements take back their primitive properties. The process of making iron consists in a decomposition of ore, to restore to the metal its true character.

The same is true of the union of soda and sulphuric acid. Each ingredient, in uniting with the other, lays down its characteristic properties. Hence the compound is denominated a *neutral* salt; a substance, whose very name indicates its destitution of the properties of the elements composing it. Decompose it, and the properties of its elementary ingredients are restored.

Of all compound substances, where a real union takes place between the elementary portions, the same is true, The simples resign their properties, on entering into the union, and resume them as soon as the union is dissolved. This is one of nature's axioms.

Wherever, then, the processes of decomposition and recomposition go on, with great activity and force, corresponding mutations in matter are the issue. This is true, whether the processes be under the influences of chemistry or vitality. In the latter case, however, the changes are most striking. In no instance does there occur an actual creation; a genuine production of something out of nothing. Yet so extraordinary, at times, are the mutations effected, that they have been so denominated. At least they have been pronounced a positive generation.

Thus, in the work called "The Book of Nature," by the late Dr. Good. (see American edition, p. 149-150,) we find, on this subject, the following paragraph.

"I have already had occasion to observe, that albumen and fibrine are substances formed by the action of the living principle out of the common materials of the food, and that it is probable the lime found in the bones and other parts is produced in the same manner. Whether the iron and sulphur that are traced in the blood have a similar origin, or exist in the different articles of our diet, and are merely separated from the other materials with which they are combined, is a physical problem that yet remains to be solved. It should be observed, however, that the sulphur does not exist in a free state in the blood, but is only a component part of its albumen. Considering the universality of these substances in the blood, and the uniformity of their proportions in similar ages, temperaments, and habits, whatever be the soil on which we reside; that those who live in a country in which these minerals are scarcely to be traced have not less, while those who live in a country that overflows with them, have not more, it is perhaps most rational to conclude, *that they are generated in the laboratory of the animal system itself by the all-controlling influence of the living principle.*"

The same appears to have been the opinion of Dr. Marcett, when he found that chickens, on which he experimented, discharged, in their fæces, a greater amount of calcarious matter, than he could extract from the food on which they lived.

Of the truth of this I entertain not a doubt. The iron and sulphur found in the human blood are not only, by the influence of the vital principle, generated from alimentary matter, in which, as a part of it, their elements had existed, but are retained, by it, in a latent, informal, and inoperative state, united to some other substance, as long as the blood continues to circumlate, a living fluid, in the vessels that contain it. They are then mere constituent parts of the fluid, possessing none of their peculiar and characteristic properties. Nor can they possibly be clothed in those properties, until the blood is drawn from the vascular system, and suffers decomposition, either as a consequence of its death, or by chemical agency. Then they appear in a formal condition, endowed with their specific and characteristic properties. Of other substances, found in the blood, the same would seem to be equally true. They are generated, by vital influence, from their elements contained in alimentary matter. This is probably the case with phosphorus, ammonia, soda, and chlorine, all of which are said to be found in the blood. Indeed, as already mentioned, the entire mass of blood is as different from that out of which it is formed, as any one compound substance can be from another.

I am perfectly aware of the opposition, and perhaps denunciation, which I am to expect from chemists, for speaking of the *elements* of iron, sulphur, phos-

phorus, and chlorine. These, say they, are themselves elementary substances, and cannot, therefore, be composed of elements.

A few years ago they say said the same of the alkalis. But time and researche have convinced them of their mistake. Nor, as will appear hereafter, are they less deeply mistaken, in other hypotheses, respecting which their present confidence appears unbounded.

As relates to the real elements of matter, they know nothing. Nor is it, perhaps, possible they ever can. The study of *elements*, like that of *snbstances and entities*, appears to be transcendental. Man does not seem to have any intellectual faculty in unison with it.

Judging from the various substances contained in the composition of *air-fed* and *water-fed* plants and animals, and which are derived exclusively from their matter of nourishment, there is reason to believe, that chemists know as little of the positive elements of the atmosphere and of water, as they do of gold and platina.

What are elements to chemistry are not so to nature. This has been too often proved to be now held doubtful. Hence the impropriety of the confidence, with which chemists assert their dogmas, as to the number and character of material elements.

There is nothing of which they speak more dictatorially and positively, than of the composition of the atmosphere. Yet from many of the preceding facts and observations, it appears very clearly, that they know nothing about it. Nothing, I mean about its *real and radical elements*. And this view of the subject is still further confirmed, by another fact, which is worthy of our attention.

The aerolites, or meteoric stones, which occasionally descend among us from above, are now believed, not to be of lunar production, nor substances ejected from terrestrial volcanos, but to be formed, by concretion, in the upper regions of the atmosphere.

But those concretions consist of several substances, not one of which chemists have been able to detect in atmospherical air.

Some of these masses, that have fallen from the heavens, are composed exclusively of two metals, iron and nickel. But they are formed generally by peculiar combinations of iron, nickel, silica, and magnesia; to which are occasionally added, small portions of sulphur and lime.

These substances, then, must exist, in the atmosphere, either *formally*, or in an elementary state.

But *formally* they cannot exist there, because they are fixed, and not volatile. By no operation, with which we are acquainted, can they be rendered aeriform and sufficiently light to float in the atmosphere. Out of the real constituents of the atmosphere, then, must they be generated, by one of those processes, which nature performs, but of which man is ignorant.

This fact alone independently of others, that have been previously stated, should prevent chemists from speaking familarly and confidently of the elements of matter, and of the composition of the atmosphere, as if they were really and intimately acquainted with them.

On the origin of the lime found in the bones and other parts of certain animals, a hypothesis is entertained which merits our attention. It is in the case of that extensive family of the feathered kingdom, that have a strong muscular stomach, lined with a dense and insensible membrane, and denominated a gizzard. Our turkies and common domestic fowls are members of this family.

These animals are known to be in the habit of swallowing gravel, of which, if they are deprived, they become sickly, their eggs are not covered with firm shells, their bones sometimes perhaps deteriorate, and, in a short time they die.

In explaining all this, the naturalist and physiologist find no difficulty. Nor does the chemist either, in his own estimation. He sees it in evidence, "clear as proof from Holy Writ," that the gravel which his chickens swallow, although he never examined it, is calcarious, and that from it alone is derived the lime which enters into the composition of their eggshells and bones. Withhold from them their gravel, and you deprive them entirely of their source of lime. Hence their bones suffer, their eggs are covered by nothing but a membrane, and the poor things die of a malady called the *mopes*. Such is the moping account of the matter, which the chemist gravely communicates to the world.

An opinion more unspeakably silly than this, has never been believed in, by the silliest of men. There is not a notable house-wife in the country, who vigilantly superintends the rearing of her poultry, who cannot correct it. And yet it is solemnly palmed on the public as *philosophy*, and defended with a zeal and dogged perseverance, which should be manifested only in a better cause.

True, our chickens and turkies swallow gravel, sometimes calcarious sometimes argillacious, and, at other times, silicious, according to the mineralogical character of the country where they subsist. And, provided it be hard enough, one kind suits them as well as another. But from neither do they derive a particle of nourishment, to be manufactured into bones, egg-shells, or any other article. It is intended exclusively for the purposes of mastication. Our poultry cannot digest the corn, wheat, oats, and other hard grains they swallow, unless they be triturated. But they cannot triturate or break them with their bills. They, therefore, swallow gravel, with which,

as with grinding teeth, their strong muscular stommacs, bruise and break to pieces the grain, after it has been sufficiently macerated in their crops. When deprived of gravel, and still fed on hard grain, their food is not digested. The consequence to them is precisely what it is to ourselves, under similar circumstances; gastric derangement, imperfect digestion, defective and vitiated secretions, disease of the whole system, and death.

Farmers know well the consequence of feeding an old horse, that has lost his teeth, on nothing but hard, unchopped corn. The grain passes through him undigested, he loses his flesh and strength, and ultimately sickens and dies. But he does not suffer for want of lime to form his bones; although he needs that substance as much as chickens. He dies from a general want of sustenance.

In the maritime districts of the Atlantic states, the poultry are as healthy, vigorous, and perfect, their bones as hard, and their egg-shell as thick and firm, as in the valley of the Mississippi. Yet in the former region there no calcarious gravel, and in the latter scarcely any other kind.

The eagle, the condor, the hawk, the kite, the common vulture, and other birds of prey, swallow no gravel of any sort. Yet have they sound health, bones of great strength, and perfect shells to their eggs. Even the humming bird, that banquets on nectar, gives to its egg a calcarious covering, and has lime in its bones.

It is singular that some of our dreaming chemists do not push their absurdity so far as to contend, that birds swallow gravel corresponding in colour to that of their eggs. It is as easy to secrete lime, without having swallowed it, in a formal condition, as colouring matter. Fowls and birds, therefore, whose eggs are reddish or speckled, should swallow reddish or speckled gravel, those with white eggs, white gravel with blue eggs, blue gravel, while such as have shells or bones, as is the case with some, of a very dark colour, should be furnished with fragments of the black marble of Egypt, Italy, Ireland, or some other place.

Still further to baffle and expose the dreams of chemistry, on this subject, we are assured that, from the body of the terebellum marmoreum, which, as already mentioned, subsists exclusively on marble, no calcarious matter can be extracted.

Feed a turkey, or a common domestic fowl on meal or well chopped grain, giving it neither gravel, of any kind, nor lime, in any other form, and it will remain healthy, become fat, and have eggs covered with shells.

Feed three fowls or turkeys on the same kind of hard grain, giving to one of them silicious gravel, to another argillacious gravel, and to the third pulverized lime, without any gravel at all. The two first will digest their food well, and will be healthy and vigorous, while the last will have indigestion, and will sicken and die.

Where it necessary for our poultry to eat calcarious gravel, to procure lime, for the purposes of their economy, the same necessity would be imposed on ourselves, our domestic animals, and indeed on all animals that are possessed of bones. Lime is as essential to us, to form our osseous system, as it is to our chickens, to form their eggshells. But we procure a sufficiency of that material, without eating calcarious gravel, because we can masticate without it. And so can they, provided they masticate with gravel of any other kind.

Feathers, beaks, hair, horns, hoofs, and claws, are found, by analysis, to contain, in their composition, a portion of ammonia. It is not, however, necessary, to cram our chickens, ducks, horses, cows, and cats, with boluses, or to drench them with potions of ammonia, to enable them to form those external defences and weapons of battle. Nor is it requisite for the musk-ox to eat food containing musk, to enable him to secrete that substance from his blood.

Yet as well might chemists contend for these necessities, as for their silly hypothesis, respecting the lime in the bones and eggshells of our poultry. There is, indeed, no absurdity too grots for such visionaries to embrace.

Between the nature of the substances, then, that are found in the fluids and solids of vegetables and animals, and that of the substances on which they subsist, there exists necessarily, as previously stated, no identity. On the contrary, they are always marked by a very striking difference. Nor is there any necessary similitude between a secreted fluid, and the blood from which it is formed.

Vegetables, I repeat, that spring from a calcarious, a chalybeate, or a silicious soil, afford, on analysis, no greater proportion of lime, iron, or silex, than those which grow in situations of the most opposite character. Plants that subsist exclusively on air and water, consist, as already mentioned, of the same elementary ingredients with those that derive their nourishment from the earth. The solid and fluid portions of herbivorous and carnivorous animals consist of nearly the same constituent elements, notwithstanding the different fare on which they subsist; nor, in this respect, do the aquatic and dry-land races materially differ.

In the blood that flows through the emulgent arteries there is no more of urea or the lithic acid, than there is in that which nourishes the brain; nor is there any difference between the blood from which saliva, and that from which the humours of the eye are

secreted. In the former there is no salivary, nor in the latter any vitreous chrystalline matter.

Such are a few of the changes, which are daily occurring in the magnificent pageant of material creation, under the influence of mechanical, chemical and vital principles. Enough, I trust, has been said, to show, that those three sets of principles and their laws are essentially distinct from each other; and that they operate, each set exclusively in its own sphere, without any mutual mixture or interference. The two remaining vital processes of absorption and intellection on which time will not permit me, at present, to dwell, shall constitute a theme of future discussion.

A few remarks on the practical mischief of what is denominated "chemical pathology" shall close this article,

Where the advocates of that absurd notion to confine their visions to paper and conversation, they might, in common with other follies, afford matter of amusement. But, when they carry them into the chambers of the sick, they become grievous and alarming instruments of evil. They have produced more individual suffering, and destroyed more lives, than the sword, the musket, and the bayonet combined. The hypothesis, and the practice growing out of it, have assumed, successively, the following shapes.

At one time, fever, scurvy, dysentery, and other complaints, consisted in a general *putrefaction* of the fluids of the body. For this imaginary condition of things, the remedies administered within and without, were *antiseptics*, many of them as unfit and pernicious articles, as man could imagine. This form of practice has destroyed its millions.

The same complaints consisted, at another time, in a general *alkalescency* of the fluids. The practice now, was to drench the patient with various acids, vegetable, and mineral, as long as he could swallow; and then to inundate him with them externally, until he ceased to breathe. This was often a most destructive practice.

Again, the diseases arose from an *acidity* of the fluids; and, to remove that, the sufferers were dosed and irritated, by acrid and nauseous *alkalis* within, and excoriated by them without, until, instead of their original disease, they died of the ignorance and temerity of the doctor.

Another notion represented fever, dysentery, and other morbid affections, as the product of a vitiated condition of the blood, that condition being the result of a chemical process, occasioned by contagion, or some other poison received from without. The mass of morbific matter thus produced, could be removed from the blood, only, by alexipharmics and sudorifics. Hence arose a course of highly stimulating practice, which, particularly when labouring under inflammatory affections, it was impossible for the human constitution to withstand. I need scarcely add, that this treatment was itself more destructive, than the pestilential diseases, in which it was employed. The human race has been rarely visited by so heavy a scourge.

Some maladies were pronounced to be the offspring of a *deoxygenated* condition of the system. To remedy this morbid state of things, those unfortunately subject to it, or rather to the *supposition* of it, were compelled to swallow, to their great annoyance, and not unfrequently their destruction, huge and repeated doses of *nitre*, because that salt contains, in its composition, an abundance of oxygen. They often drank vinegar and even sulphuric acid, in large quantities, for the same reason.

In the perverted fancy of a certain distinguished chemical pathologist and his followers, pulmonary consumption was the result of a hyperoxygenated condition of the lungs. To cure this, their patients were lodged in cow-houses and stables, bathed in the reeking humidity, and suffocated by the stench of those repositories of nastiness, under the whimsical belief, that their atmospheres, containing a diminished proportion of pure air, would deoxygenate the lungs, and restore health. The farce was acted in England, not only within my own recollection, but by a physician, of no ordinary talents and fame, with whom I was several years in correspondence.

Some diseases, arising from an excessive *thinness* of the fluids, were to be cured by *insipissants*; and others, depending on a *laxity* of the solids, were to be removed by *astringents* and *tonics*. The latter notion and practice, present a ludicrous mixture of chemistry and mechanics.

Not many years ago, some of the chemists of France, in analyzing certain portions of the bodies of those, who had died of bilious fever, discovered in them, or imagined they discovered, a deficiency of gelatine. This deficiency was immediately pronounced the cause of the disase. The effect was electric. The report and belief of it spread far and wide, with nothing less than French rapidity. The consequence to the confectioners of the country was highly profitable, and to the poor calves no less disastrous. The latter were slain, in thousands, to furnish the former with the requisite materials to prepare gelatine, (vulgarly, calves-foot jelly,) as a sovereign remedy for every modification of billious fever. Instead of carrying along with him, therefore, a well supplied magazine of tartar emetic, quinine, cinchonine, and cornine, every country practitioner armed himself, now, with jars and gallipots of gelatine, and resolutely poured it into the stomachs of his

patients. Nor was he a little astonished, when those uncivil and refractory organs poured it back again, without sending the disorder packing along with it. The effect of such folly, in augmenting disease and suffering, and in destroying life, need not be represented. To every skilful practitioner of medicine, it will appear in relief sufficiently bold. It tended, moreover, to the disgrace of the profession.

Nor are the various lithontriptics, as they are called, which have been so confidently administered, on chemical notions, entitled to any higher commendation. They have never dissolved a single calculus in the kidney, or the bladder; nor will they ever do it, while the present laws of the animal economy continue in operation. But they have done great mischief in the hands of empirics.

Even the practice of surgery is not free from the fooleries of chemistry.

Does a wound or an ulcer show a disposition to sloughing or mortification? The part is immediately enveloped in some famed antiseptic poultice, or kept constantly dripping with an antiseptic lotion. On this puny and miserable local practice the surgeon relies, to the entire neglect of constitutional remedies, which are alone competent to the removal of the complaint. But the follies and evils of chemical pathology are too numerous to be all recited. They would fill volumes.

To conclude then. As the source of Pharmacy, chemistry is essential to the profession of medicine. But in no other respect. As often as it has made its way into physiology, pathology, or practice, it has spread around itself error, suffering and death. The exceptions to this are so few, as to do no violence to the general rule. They relate chiefly, if not entirely, to noxious agents lodged in the stomach.

From the matter contained, and the sentiments expressed, in this paper, let it not be imagined that I am a foe to chemistry. No opinion could be more unfounded. I am an admirer of the science, and deem it equally interesting and important. In my youth, I cultivated it, for several years, with great ardour, and no less delight.

But I admire it only when it is kept within its proper sphere. There alone am I friendly to it. There alone is it either interesting or useful. When pushed beyond that, and obtruded into another sphere, for which it has neither affinity nor fitness, it loses, at once, its attractiveness and value, and becomes offensive and mischievous.

Confine it to dead matter, and I am its friend and advocate. But I am hostile to all attempts to introduce it into the economy of living matter; because I conscientiously believe, that such attempts are founded in error, and productive of evil.

NOTE.—To prevent misconceptions of my meaning, in several passages of this paper, where I have been compelled, for the sake of avoiding too much prolixity, to speak in general terms, a very brief exposition would seem to be requisite.

I am aware that in the performance of many of the functions and processes of the body, principles purely mechanical are in constant operation.

In effecting the circulation of the blood, the heart, as I have elsewhere observed, acts as both a forcing and a suction-pump. Locomotion generally, as well as the admission of air into the lungs, and its expulsion from them, in respiration, is performed on mechanical principles. So are speaking, chewing, swallowing, and the peristaltic motion of the stomach and intestines. The blood also obeys, to a certain extent, the influence of gravitation.

But in all these instances, and in every other that can be adduced, the mechanical process, although subservient to the vital, is entirely distinct from it. They do not, in the slightest degree, interfere with each other. The one simple commands, and the other, during health, implicitly obeys, each occupying its own rank and station. Vitality furnishes the spring of action, and mechanics the apparatus. But mechanics can have no agency in giving the spring, nor vitality in the form and arrangement of the instruments. Although, therefore, the two sets of principles are essentially distinct from each other, there is no such incompatibility between them, as to prevent them from being concerned in the same function, as principal and subordinate. Perhaps the chief reason of this may be found in the fact, that mechanics are concerned with *masses* of compound matter, and vitality with its *elements*.

But, between chemistry and vitality, no such compatibility exists. They both act on and with matter, in an elementary state. Being essentially different in their principles, therefore, they cannot act together. The presence of the one is compatible only with the absence of the other. Admitted into the same process, they would necessarily clash, obstruct each other's movements, and produce confusion.

This explanation has been added since the reading of the paper, in the Lexington Medical Society, at whose request, as the following note indicates, it is printed.

Lexington, November 29th, 1828.

DEAR SIR,—We have been appointed a committee, by the Lexington Medical Society, to ask of you, for publication in the Transylvania Journal of Medicine, the very able and interesting paper read by you before the Society at its last meeting.

With sentiments of the highest respect, we remain your most obedient and humble servants.

WM. M. GWIN, M. D. of Tennessee.
RICE M'COY, of Michigan.
WM. BOMAR, of Virginia.

PROFESSOR CALDWELL.

ART. 65.—*Outlines of Horticultural Chemistry: Vegetable Physiology.*—*By* G. W. Johnson, Esq. *Great Totham, Essex.*—[From Loudon's Gardener's Magazine.]

The *flowers* and *seeds* are those essential parts of a plant by which it is preserved from extinction. Linnæus has compendiously designated the parts of fructification "a temporary part of vegetables, terminating the old individual and beginning the new;" a definition, however, only strictly true when applied to annuals.

The *petals* of the flower evidently act an important part in nourishing the more essential parts of fructification, since, if they are removed from plants naturally possessing them, I am not aware of a single instance in which the seeds will advance a grade further towards maturity. The *stamens* and *pistils* are the most essential parts. The first are the members that secrete the pollen, or fecundating dust, without the application of which to the pistils the seed is never fertile. It is the *anther*, or summit of each stamen that secretes this fecundating matter. The pollen appears to the unassisted vision merely a fine powder; but, in fact, each grain is commonly a membranous bag, varying in form in different species. Pollen is chiefly discharged from the anthers during dry warm weather; but each vesicle of it remains entire until it comes in contact with moisture, when it immediately bursts and discharges its minute particles in a form absorbable by the small ducts of the pistil. The necessary degree of moisture usually exists upon the summit of the pistils, to which the bags of pollen cling, and thus more securely determine the impregnation of the seeds. We are furnished, by a knowledge of these facts, with a reason for the great injury occasioned to orchards, &c. by excessive wet weather during the time of flowering. The pollen is washed away from the anthers as it is secreted, and exploding at the instant, either does not settle at all upon the pistils, or alights upon them whilst loaded with unnatural moisture which is again shaken off, or is prevented entering their orifice. They warn us, also, from watering or disturbing unnecessarily the herbage of plants under our care whilst they are in bloom. It is a fact of some importance to be known by the cultivators of hybrids and new varieties, that in dry weather pollen may be conveyed to a considerable distance uninjured. This is demonstrated by many observations on accidental impregnations by the agency of winds, &c.; and still more decidedly by Linnæus, who kept some of the pollen of the Jatropha urens in paper for more than a month, which afterwards fertilized the pistils to which it was applied. In the present general diffusion of botanical knowledge, it seems almost trite to observe that the seed-grower should neither exterminate the barren plants of the diœcious class, as in spinach, asparagus, &c., nor remove the unfertile flowers of cucumbers, &c.; for, without these, the female blossoms would be equally unproductive. Many insects are highly injurious in the hot-house, &c. to the plants they contain; but an indiscriminate destruction is not to be recommended. Many of them bear pollen on their wings, &c. to female flowers, which otherwise would remain unimpregnated. The humble-bee, above all other insects, I would have befriended; for its robust and hardy form enables it to get abroad and be employed in this useful work, when weaker insects are confined by inclement weather.

The stamens are changed into petals in double flowers, which are consequently unfertile: they are often likewise obliterated, either by excessive nourishment, or when the plant increases much by root, as in the Fiery Lily. (Lilium bulbiferum.) If this excessive production of root is very remarkable, it sometimes prevents the production of the flowers of the plant entirely, as is the case with some early varieties of the potato; for Mr. Knight demonstrated that if the tubers of such were removed as they were produced, the plants blossomed as freely as later tubering varieties; and, *vice versa*, the removal of the blossoms of tuberous-rooted plants promotes the size and number of the tubers. It is not to be supposed, however, that fibrous-rooted plants are not similarly affected. I have observed a gooseberry bush, that, from being under the shade of trees, &c. had never borne fruit during a series of years, to throw out annually a very excessive number of suckers. Again, fibrous-rooted land-plants, which by accident are growing in water, increase the number of their radiculæ enormously, whilst their fructification is diminished and abortive in proportion.

THE PARTS OF A COMPLETE FLOWER.

a The calyx.
b The petals of the corolla.
c The anthers.
d The stigma.
e The style.
f The germin, or seed-bud.
g The filaments.

Sexual organs.
- The parts of a stamen, or male organs.
  - *c* The anther.
  - *g* The filaments.
  - The anther prepares and contains the pollen or fertilizing dust.
- The parts of the pistillum, or female organs.
  - *d* The stigma.
  - *e* The style.
  - *f* The germin.

Of the pistils, the two essential parts are the *stigma*, or orifice for the admission of the pollen, gene-

fully on the summit; and the *germen*, which is the rudiment of the future seed-vessel. Pistils, like stamens, are obliterated in double flowers; otherwise they are not so liable to become petals.

The production of the *seed* is "the being's end and aim" of every plant: all its other parts, by ministering in some way or other to its maturity, indicate its importance. Not perceiving that a description of the various parts of a seed would lead to any practical hints to the gardener, I shall proceed to the consideration of the phenomena of *germination*.

When a seed is placed in a situation favourable for vegetation, it soon swells, its skin, or *testa*, bursts, and a shoot, denominated the *radicle*, is protruded; and, in a short time, this is followed by a second, which is named the *plumula*. The radicle by degrees sinks into the earth, and becomes a perfect root; whilst the plumula rises above the surface, to expand, and complete the form of the perfect plant. The essentials for germination are several. The first of these appears to be the perfect maturity of the seed; for, although Sennebier found that peas will sometimes vegetate, though sown in a green and soft state, yet it is certain that the plants raised from immature seed are always weak in their growth, and unproductive. Some seeds require to be sown immediately after they ripen. The coffee bean, and the seeds of angelica and fraxinella, refuse to germinate if not sown within five or six weeks after they have been gathered; but by far the majority of seeds retain their powers of vegetation, if carefully preserved, for years. Home sowed barley, which vegetated after being gathered 140 years. Farinaceous seeds, that is, such as contain a large proportion of starch, usually are those which retain their vitality the longest (barley, wheat, and oats, are of this number), inasmuch as that the constituent is very slow in decomposing. Oily seeds, and those enclosed in juicy berries, or other seed-vessels of a mucilaginous or saccharine quality, are the most liable to spoil. It is to be observed that, for the gardener, old seed is sometimes desirable; the plants from it run less luxuriantly in foliage, and produce their blossom and fruit more early than those from new seeds: hence, for melons, early and late crops of peas, &c. seed that is a year or two old is to be preferred.

No seed will germinate without oxygen gas, moisture, and a certain degree of heat are present. The requisite proportions of these vary in different individuals; but, in the total absence of any one, no seed will advance a single grade in vegetation. When all are present to a seed, carbonic acid gas is evolved, and oxygen absorbed. This gas is afforded to the seed from the atmosphere, in which we shall see hereafter it exists in the proportion of about 21 per cent. From the experiments of Saussure we learn that, weight for weight, wheat and barley, during germination, absorb less oxygen than peas; whilst these consume less than beans and kidney beans. The first two may, therefore, be buried at a greater depth below the surface of the earth than the last three, without vegetation being prevented; for it is the want of a due supply of oxygen, at great depths from the surface, that prevents the germination of seed so buried. Seeds that are thus situated, however, will often retain their vegetative power for an apparently unlimited period: hence earth, taken from a considerable depth, will often, when brought to the surface, be covered with thistles, charlock, &c. In botanic gardens, plants, that were supposed to be lost to the establishments, have often been recovered by the casual digging over the borders where they had been grown; some of their seed having been buried in by a previous turning over the soil. Seeds abounding in oil have been observed to retain their vitality the longest when so buried.

Oxygen gas is so essential to germination, that any application to seeds that affords it to them in abundance greatly accelerates the process: hence, M. Humboldt found that chlorine, which yields abundance of that gas when in contact with water, by combining with its hydrogen and setting the oxygen at liberty, produced this acceleration of vegetation. At Vienna several seeds, which were of considerable age, and had constantly refused to germinate, did so readily when treated with it. Plants raised from such seeds are undoubtedly more weak than others raised from seed in which no such extra-stimulus is required. Mr. George Sinclair, author of the excellent *Hortus Gramineus Woburnensis*, however, informs me that he has employed chlorine with singular success. He obtains it by mixing a table-spoonful of muriatic acid with a similar quantity of black oxide of manganese, and half a pint of water. After allowing the mixture to remain two or three hours, the seed is to be immersed in the liquid for a similar period, and then sown. Another, and, I consider, the most eligible mode of applying the chlorine, was also suggested to me by the same distinguished horticulturist. In this way, he says, he has made tropical seeds vegetate, which refused to germinate by other modes of treatment. He placed the mixed ingredients mentioned above in a glass retort, inserting its bulb in the hot-bed, and bringing its beak under the pot in which the seeds were sown, connecting it with the draining aperture of the pot. The chlorine gas is gradually envolved, passing through the earth of the pot to the seeds, accordingly as the heat required for the different species induces.

Aghard and others have proved that seeds will not germinate in any gas without a mixture of oxygen.

(*To be continued.*)

ART. 66.—*Tripolium Incarnatum.—Flesh coloured Clover.* To J. C. Loudon, Esq. F. L. S. &c. [From the British Farmer's Magazine.]

Sir,—Perceiving in your valuable publication, the Gardener's Magazine for October, a very short account of a clover which is rapidly spreading through France and the south of Germany, where it is looked upon with the degree of attention it well merits; we think it might not be uninteresting for you to be furnished with some further notices respecting this annual—the tripolium incarnatum, [farouche, fr.] flesh coloured clover. We ourselves having witnessed its growth and produce in the south of Germany (from whence we have just returned) can speak with confidence as to its unprecedented fertility and precocity on light sandy soils, which would scarcely repay the culture of any other plant.

We therefore take the liberty of enclosing you the accompanying remarks, which, if found sufficiently interesting, you are at liberty to publish in an early number of your magazine.

We were first directed to examine into the qualities of the flesh-coloured clover, from reading M. de Dombarle's opinion concerning it in the Annales Agricoles de Reviere; we subjoin a translation and add our own remarks as to a crop which we saw at the royal establishment of Hohenheim, in the kingdom of Wirtemburg.

Five years experience, says M. de Dombarle, in the culture of this plant leave me no further doubt as to the advantages which are to be derived from its propagation in the north of France.

It is true it only gives one cut, but upon the same soil this one cut is equal to two of red clover; but a circumstance which renders it still more valuable than the latter, is its coming early enough to allow the same soil to be prepared for other crops the same year. The flesh-coloured clover consumed green affords an excellent food to all species of domestic animals, even to pigs; but converted into hay it is in a trifling degree inferior to clover or lucern. It is not at all fastidious either as to soil or culture, and although introduced to us from the most southern provinces of France, does not suffer from our winter frosts, provided it be a little grown before they commence. But what appears to me to meet the farmer's attention most, is the period at which it is sown, viz: in the month of August or September. At this time the farmer will know what degree of reliance he may be able to place on his clover crops for the ensuing year; if any part of them should have failed, they may be replaced by this equally valuable fodder,—an important consideration for those who depend on the produce of their artificial grasses for the maintenance of their stock.

It is cultivated as follows:—one slight ploughing after harvest is sufficient to prepare the soil for the reception of the flesh-coloured clover. I have this year, however, tried two methods of cultivation on the same field; the first part I only grubbed up the earth with the six share extirpator, the other part was ploughed. The seed was sown and harrowed in both. That part that was not ploughed is now decidedly the best. The quantity of seed requisite is about 25oz. per acre.—*Annales Agricoles de Reviere*, 1r. livrasion. p. 238.

We saw this clover cultivated at Hohenheim, near Stuttgardt. M. de Dombarle had favored M. Schwertz (the celebrated author of the Agriculture of Flanders) with a *quantity sufficient* to sow about two acres.

It was sown upon a stiff red clay in the middle of April; the spring was excessively dry, and yet it was fit for cutting six weeks after it had been sown, and a most luxuriant crop it was. M. Schwert intends to cultivate it extensively, since, soiling being one of the principal dependencies of the estate for manure, it enters most admirably into the rotation of green crops, which are as follows:—

Flesh-coloured clover, sown in September fit to cut in April; then comes the first cut of lucern—the first cut of clover—the second cut of lucern: the tares and peas sown in spring—the second cut of clover—the third of lucern—cabbages, turnips, potatoes and dry food. This is the system pursued at Hohenheim. The culture of the flesh-coloured clover allows M. Schwertz to commence his green fodder full three weeks or a month before his neighbours.

We are ourselves satisfied of its importance, and hope by thus making known the result of our observations, to cause another valuable fodder to be added to those already so happily cultivated in Great Britain. We are, &c.

London, Nov. 8, 1828. R. & D.

ART. 67.—*Effects of the late severe Winter in the Western part of the State of New-York on Foreign Plants.* By D. Thomas.—[To the Editor of the New-York Farmer.]

I have been pleased with the notice of "*Foreign Plants which have withstood the late severe winter at the Linnæn Botanic Garden,*" by the very intelligent proprietor of that establishment; and perhaps it may be interesting to *some* readers of "The New-York Farmer" to have a similar statement from a higher latitude.

My garden is situate 1 1-2 miles east of the Cayuga Lake, at an elevation of 300 feet, or nearly 675 feet above the level of the ocean. It has a western

aspect, and is rather exposed to the bleak winds of that quarter.

A low temperature appears to be only one of several causes which destroy some exotics in winter. Cold water (from rains and melting snows) confined near the surface by a close subsoil, is another cause from which the sloping sides of sandy or gravelly hills are exempt. Much also depends on the Autumn. With us, it was remarkably rainy, and consequently unfavourable for tender shrubs which grew late in the season, with little sunshine to mature and harden the wood. But intense cold of a few days is not so destructive as less rigorous frost of long continuance.

Twice, the mercury in the thermometer sunk below zero, probably 10 deg., for its greatest depression is not exactly ascertained.

Although with us, the peach tree and quince tree are perfectly hardy, our climate must differ materially from that of Flushing. My *Lonicera sinensis* was protected near the roots by dead leaves from the woods; and beneath this shelter the leaves are green, but above it even the branches are killed. This remark will extend to the *multiflora rose*, *the champney rose*, *Bignonia crucigera*, *Vinca major*, and even *Vinca minor*, where the stems were raised a few inches from the ground. The exposed parts of *the English Ivy*, *the Scotch broom*, *Vitex agnus castus*, and *Jasminum humile* (which withstood the preceding winter) are dead.

Rhododendron ponticum, *Rhododendron punctatum*, *Gordonia pubescens*, (*Franklinia*) *Ilex opaca*, and *Fontanesia phillyræoides*, though sheathed with straw, are much injured. Many shrubs, too tender for the freezing winds of our winters, are finely preserved, when laid prostrate, by a covering of manure from the horse stable. Some low leaves of *Magnolia glauca*, sheltered in this manner, have preserved all their greenness till Spring.

Tamarix gallica, *Bignonia grandiflora*, *Koelreuteria paniculata*, *Ephedra distachya*, *Schizandra coccinea*, *Sophora Japonica*, *Stewartia virginica*, and several species of *Magnolia* and *Æsculus* appear to be hardy. Respectfully,

DAVID THOMAS.

Greatfield, N. Y. 4th mo. 15, 1829.

ART. 68.—*Cultivation of the Vine in the United States.* By the EDITOR. [Continued from page 95.]

The information which we are attempting to collect for our readers comes to us from such various sources that we shall not be able to arrange it in the manner we should wish. But from the facts which we shall adduce, we hope some useful conclusions may be drawn.

Mr. M'Call, in a letter to Mr. Dufour, dated "Retreat, near Dublin, (Georgia) March, 1825," gives a detailed account of his undertaking. He states that he was the first person in Georgia who cultivated the vine with satisfactory results. Of fifteen or more foreign varieties, the names of which he was not fully assured, after a cultivation of five years, only five kinds were worth preserving. Two of these, after three years of unsatisfactory experiments, produced him good wine. One of them, resembling the Madeira, ripens from the 12th to 25th of August, and produces large and certain crops—the bunches weighing 5 oz., the berries large, crowded on the bunch, skin thick and red, and contains, he thinks, a superabundance of tartarous acid and mucilage. In 1820, the pressed juice raised the hydrometer of Beaume 6 1-2 degrees, and in 1824, about 9. He made wine with sugar and brandy, and also without the latter.

Another grape, called the Warrentown, a village of Georgia, from whence he obtained it, produced him wine. The plant resembles the Queen Grape of Hungary. The fruit ripens from the 5th to 25th of August; bunches 5 oz.; berries thick on the bunch, moderate size, round, nearly black—producing thin white juice, which is vinous, but rather tart. Four pounds of sugar raised the hydrometer 15 1-2 deg. in a wet season. The wine was of an amber color, less strong than Madeira, and of exquisite flavor.

Of the native blue bunch grape, *vitis sylvestris*, Mr. M'Call says there are several varieties flourishing, both in the low and high grounds of his vicinity, varying in their saccharine and tartarous properties. The plant and fruit resemble the Warrentown, but the juice is red. He tried a variety collected from the low grounds, which raised, on the addition of 4 1-2 pounds of sugar to a bushel of bunches, the hydrometer to 16 deg. He thinks if this grape was cultivated eight or ten years, it would make wine as strong as the best claret, without adding sugar.

The Wild Muscadine, or Bullus Grape, *Vitis Vulpina*, has a small, smooth leaf; large, round berries, with few on a bunch. This, mixed with the former, made wine which was of a claret color, with a tint of yellow; and at eighteen months old, was a little tart. Mr. M'Call mentions several other species, of which he had not made wine.

There is, continues the writer of the letter, a great variety of soil in his section of Georgia, and suitable for the grape. The medium temperature in his latitude, 32 deg. 27 min., from eight years' observation, is 64 1-4 of Fah.; extreme cold, 9 3-4, and extreme heat 101 degrees.

In the conclusion of his long and interesting letter,

Mr. M'C. observes, that adding sugar to the must, before the fermentation begins, is a legitimate practice; adding brandy to wine, to give it strength, is a fraud. A far greater proportion of the imported wines have, we are informed, brandy mixed with them. Indeed, a Frenchman, who has all his life been in the habit of drinking wine instead of tea, at supper, when he comes to this country, can no longer find his favorite drink, but is under the necessity of falling in with our custom of sipping the decoction of dried China leaves. We have only to go down on our wharves, and see landing, direct from Marseilles, *imitated Madeira* wine.

We learn that Mr. M'Call has increased his vineyard to such an extent that he made, last year, 500 gallons of wine, and this season expects to make from 12 to 1500. It is much admired, and sells for two dollars per gallon.

The next letter which we shall notice, is from Mr. Cull, of Newbury, York County, Pennsylvania, and is dated March 6th, 1825. This gentleman, in partnership with Mr. J. Shelly, engaged a professed vine-dresser from Germany, who located the vineyard on the side of a very steep hill, one-fourth of a mile from the Susquehanna, at the edge of an alluvial formation. The hill ran north and south, giving the vineyard an eastern exposure. The vine-dresser, at great expense, levelled the ground in strips, by raising stone walls. The proprietors obtained the first year, from Baltimore, the "Madeira" and "Lisbon" large blue, sweet, succulent, thin skinned grapes, possessing but little coloring matter; the "Bordeaux," a flesh-color, large size, thin skin, round; and a "small blue" grape—sweet, and abundant in coloring matter; the "Muscatel," a large white, sweet, juicy, and thin skin. Mr. C. is not certain that they are known by these names in other places. The first four described kinds grew well, and produced equal to the most sanguine expectations. The white one also succeeded well, but required covering, to protect it from the winter. The wine made from a mixture of all the kinds, at 18 months old was of the color of Madeira, and much admired by judges. In wet seasons, the white grape in particular did not come to maturity.

Mr. C. states, that there are several varieties of native grapes in his vicinity, that might, in all probability, be an object of cultivation.

The writer of the letter considers both soil and climate of that section of our country, well adapted to the culture of all foreign grape yet tried. From some experiments made in that vicinity, he thinks it highly probable that the grape will succeed equally well on level as on declivous grounds. Those who intend to cultivate the vine should give this subject attention. The difference of our climate from that of the wine countries in Europe may require a different soil and exposure, and some variation in treatment.

Mr. C. observes that it is anticipated the culture of the vine will tend to redeem the character of the people, as it respects strong drink.

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We would be very much indebted to those who have facts concerning the cultivation of foreign or native grapes in this country, to transmit them to us. By so doing, they will both favor and benefit the public.

ART. 69.—*On rendering Pear Trees and other Fruit Trees fruitful, by operating on the Borders, and by Natural Training.* By Mr. Robert Hiver. [From Loudon's Gardener Magazine.]

Sir,—There are few subjects in horticulture which can be more acceptable to your readers than a system by which good crops of fruit may be obtained from pear trees planted against the east and west walls in gentlemen's gardens; the bad crops these trees have afforded have been proverbial ever since I can remember; and the unnatural schemes which are now resorted to, such as strangulation, ringing, depressing of the branches, and reverse-grafting, show that a good system of cultivation is not yet established. This failure has generally been imputed by gardeners to the climate; but as the trees are seldom without fruit at the extremity of the branches, the supposition may be considered erroneous.

It is about twenty years ago since I noticed a brown Beurree pear tree, trained against the east front of a farmer's cottage. This tree grew upon a limestone rock, where there was very little earth, yet it never failed to yield, yearly, plenty of large and well-flavored fruit. From what I observed of this tree, it appeared evident that the rich and deep border, usually prepared by gardeners, was decidedly wrong, as the plants in this case generated too much sap, which always induces disease and barrenness; and, I believe, it will be found in the tree, as in the human constitution, that the state of health consists in the medium between emptiness and repletion. Sir H. Davy has shown the utility of stones in agricultural crops; and I have found them exceedingly beneficial in the formation of fruit-tree borders; they prevent the accumulation of water in very wet weather, and also retain sufficient moisture for the purposes of the plant in dry seasons. In 1813, I replanted an old pear wall, 240 ft. long: the border for these trees was 12 ft. wide, and only 26 in. deep, 8 in. of which were filled with stones, such as could be most readily procured in the neighbourhood, and the remaining 18 with the mould which composed the old border.

By this scanty supply of earth for the roots of these

plants I have succeeded in obtaining a fruitful and healthy growth, equally remote from debility and luxuriance; and by this simple process I procured fruit all over the tree, as regularly as if it had been mechanically placed, both plentifully up the main stem, and on the lowest horizontal branches. My trees are fan-trained in the best manner; the shoots are kept as uniform and straight as the plications of the instrument from whence the term is derived, and, when the fruit is full-grown, exhibit one of the most interesting scenes to be met with within the confines of a garden.

With regard to pruning, the knife should be used as sparingly as possible; I conceive it to be as injurious to this tribe of fruit-trees, as the lancet is to animal life; it creates those inconveniences which it is employed to remove: whoever indulges in its free use, most certainly defeats his own purpose. Let any man who is inclined to dissent from this opinion, consider the common thorn confined in a hedge, where it annually undergoes the operation of clipping, and the shrub in its primitive growth, and he will want no arguments to convince him of the impropriety of the practice. But my plans require very little assistance from the knife: they make no breast-wood, the energies of the tree being chiefly engaged in forming blossom-buds for the future crop.

It may be justly inferred, from what is here stated, that the bad success which most gardeners have experienced in the cultivation of this valuable fruit, arises principally from the luxuriant state of their trees; the limited space which they occupy on the wall is so disproportionate to their natural growth, that it is almost impossible, with deep and highly-manured borders, to reclaim them from a habit of plethorical sterility. The farina, and the whole fructification, partake of this unhealthy condition; and it may be observed, that fruits fecundated with bad pollen scarcely ever resist the atmospheric changes which they afterwards encounter.

From observations made in vegetable physiology, I am persuaded that the tree is principally the produce of the earth, and the fruit of the atmosphere; as great diminution of vigour may take place in the one, without any perceptible alteration in the other. It is, therefore, the first object of the cultivator to proportion the supply of nutriment to the extent of his tree, and this will be best effected by the shallow border above described.

These are the remarks of a man long devoted to the difficulties of his profession, such as have been suggested by nature, and confirmed by experience; and if they are found to be sufficiently instructive for the pages of your useful miscellany, I shall feel happy in being numbered amongst your many correspondents.

I am, Sir, yours, &c.

ROBERT HIVER.

ART. 70.—REVIEW.—*The Young Gardener's Assistant, containing a Catalogue of Garden and Flower Seeds; with practical directions under each head, for the Cultivation of Culinary Vegetables, some of which are not generally introduced into the United States.*—[By T. BRIDGEMAN, Gardener, Seedsman, Florist. New-York, 1829. Page 96.]

In taking a walk, nearly twelve months ago, to the suburban gardens of this city, we called at the Bowery Green House, of which Mr. T. Bridgeman is the proprietor. After making our introduction to him, we expressed, in the course of the conversation, which naturally led to the subject of gardening, a desire to have such a practical man as he on the list of our subscribers, and among the contributors to our columns. Although he concluded to patronise our work, yet in no light in which we could exhibit the subject, could we convince him of the advantages of a familiar acquaintance with the writings of authors on the theory and practice of gardening. In fine, we found him an anti-book culturist.

The sentiments advanced by Mr. Wilson, in his comparisons of the garden productions of the Middle States and those of England, being in his estimation, so far from the truth, he dropped his spade, and took his pen, to redress his country's wrongs. Having, as he conceived, restored truth to her rightful inheritance in the columns of the Repository, he concluded to measure spears whole length with Mr. W. and write a book—and thus the origin of the Young Gardener's Assistant. Having made such liberal extracts in former numbers of the Farmer, we shall content ourselves with a few remarks in relation to the work, and the sentiments advanced.

When we first invited Mr. B. to contribute to our columns, he took it, as he has since informed us, as a jocular piece of irony, not considering himself qualified to communicate to others. But having been in the habit of recording the transactions relating to the management and produce of his garden, he found no difficulty, particularly when roused in his country's cause, in committing his thoughts to paper. We have often had occasion to speak of the beneficial effects of practices that tend to bring the mind to a habit of observation,—and we have considered the recording of transactions in tillage to have these happy effects—not only on the minds of culturists, but to make them better farmers and gardeners. And in the case of Mr. B. we think we have an illustration in the practical part of gardening. From what we gather from the tenor of Mr. Bridgeman's book, we should suppose that he paid but little attention to the mere *on dits* or *dictums* of any, but that he pursued that course which his judgment pointed out; and in this, particularly, we value his book—leading the

young gardener to learn to depend more on his own judgment than on the rules of custom.

The immense wilds of uncultivated lands, which have ever laid before the inhabitants of this country, and the abundant crops that they produce when newly cleared, have led farmers into the practice of cultivating as much land as they possibly could. This practice has favored migratory habits, and confirmed systems of farming very much at variance with the leading principle of Mr. Bridgeman's management—to make the most of a piece of ground. It is unquestionably true that a majority of the farmers of the United States till too many acres—that they toil harder, and derive a less income than they would from a much less number. If manure is spread sparingly, it neither makes the first crop luxuriant, nor is it sufficient for a second or third, particularly in the same season. In the case of an early summer crop, if the manure in the spring was not sufficient for healthy vegetation, there must be incurred for another crop the same season, the expense of putting on more manure, or the ground will lie unoccupied more or less time. If it lies vacant for the remainder of the season, the manure, undergoing fermentation and the changes which follow, will not all combine with the soil and there remain for the dilatory farmer to put in his next crop, but will, in no small proportion, be taken up by weeds, or escape in the form of gas into the air. Farmers managing in this manner, may be compared to wine merchants, whose casks are allowed to leak—little, indeed—but *just sufficient to take off all the profit.* And hence it is of great importance that when the manure is spread on the ground, there should be an immediate and constant succession. Well cultivated soils require no *rest*, but merely the proper rotation. It is the practice of Mr. B. and other good gardeners to have two or three crops growing at once on the same piece of ground. For instance—in hoing early lettuce the second time, radishes are sowed between the rows, and as space is left by pulling up alternate heads of the lettuce, cabbage plants are set out; and before the latter obtain much growth, both the lettuce and radishes are removed. It is from thus managing, in part, that our gardeners realize a greater income from three or four acres than many of our farmers do from as many hundred acres. Proprietors of small pieces of ground, both in the city and country, might take from the pages of the Young Gardener, some useful hints to cultivate a supply of culinary vegetables for their own use. The satisfaction of eating the fruit of our own raising enhances their value at least 25 per cent.

Among the plants, for the cultivation of which the Young Gardener's Assistant contains directions, are a number of culinary vegetables not generally introduced into the United States. The introduction and successful cultivation of useful foreign vegetables add to the resources of our country, and multiply our comforts. The great variety of soil and climate in the United States holds out many encouragements for the growth of exotics. Indeed, the different soils found in many gardens, and on almost every farm, render an acquaintance with a great variety of plants highly desirable, both for ornament and profit. We recently saw, for instance, in Bridgeman's Garden, several varieties of broad beans, *Vicia faba*, in a most vigorous and thrifty growth. They occupied a clayey spot of ground that was not suitable, so early in the season, for any other vegetable. They put forth a beautiful blossom, and would serve as an ornament for the garden, green-house, or parlor.

In writing his book, Mr. Bridgeman, like every well bred author, has not forgotten the ladies. He has devoted a few pages particularly to them, in giving a catalogue of flower seeds, and directions for the management of ornamental plants. Having given in a former number of the Repository, Mr. B's. remarks on this branch of culture, we will make an extract from Mr. Cobbett's American Gardener. "I hope," says he, in speaking of ornamental plants, "that no man, who has the means to provide such pleasures for his wife, or daughters, will talk to me about the *uselessness* of a green-house. Of what *use*, then, is *fine* linen, when coarse is cheaper, and will last longer? Of what *use* is beauty in a *horse*, a *house*, or in any thing else? Of what *use* are sporting dogs and guns? The *use* of these things is, that they *give pleasure;* that they render life pleasanter than it would be without them. And why not, on the same principle, call a green-house *useful?* Of what *use* is money, that thing which every one seeks to possess? Of what use, indeed, but to be expended on things which tend to make life easy and pleasant? Therefore, a green-house comes fairly within the scope of usefulness; for, from it females of a family would receive constant amusement and delight, during a season when they are cut off from almost all other recreations. Let me not, however, in using these arguments, be supposed to doubt of the disposition of American husbands to gratify their wives in this respect; for many and striking as are the traits, that distinguish the American character, none is so striking, and none exalts it so much, as the respect and deference of the male towards the female sex."

To return to Mr. Bridgeman's book.—The style is free, and the language appropriate; the plan is judicious, and the contents embrace much well arranged practical information, unincumbered with disquisitions foreign to the object of the work. We very cheerfully recommend it to our readers, as a cheap and useful book.

ART. 71.—*Remarkable Law of Vegetable Life. The Cause of Smut in Wheat.*—[From the British Farmer's Magazine.]

SIR,—At page 290, vol. i. of the *Quarterly Journal of Agriculture*, will be found a very interesting account, by Mr. Fleming of Flisk, of a *remarkable law of vegetable life*. To this law I beg leave to call your attention for a short time, and afterwards state its application to the present subject.

I transcribe the whole of Mr. Fleming's observations. They are as follows, viz:—

"It frequently happens that the results of experience are extensively acted upon by practical men, in reference to particular operations, long before the principle concerned in the arrangement be distinctly recognized, or its application to objects, under other circumstances, be deemed either possible or expedient. The theoretical naturalist frequently receives the first hint of his generalizations from those who have confined their attention to effects merely, and who have marked these even under peculiarly confined limits. Yet we must be contented to receive knowledge from every quarter, though in scanty portions, and rejoice in every contribution likely to accelerate the march of improvement.

"It is well known, that, in the animal kingdom, all those circumstances which accelerate the growth of the body, exercise a proportional influence on the reproductive system, so that the period of puberty is uniformly earlier in domesticated than in wild animals, and in those which are fed plentifully with food than in those which are scantily supplied. These effects of an abundant supply of food are exhibited throughout the whole range of the animal kingdom, as far as observation has hitherto extended. The very reverse of this arrangement seems to prevail in the vegetable kingdom. Where plants are furnished with an abundant supply of food, their reproductive energies develope themselves slowly, and flowers, and fruits or seeds are late in appearing. On the other hand, when the supply of nourishment is scanty; when the plant is, as it were, starved, and when death is threatened, the reproductive energies act with readiness, flowers and seeds are produced, and the extinction of the race guarded against; or, in other words, *the scantier the supply of nourishment, the earlier will a plant propagate its kind.* Let us now attend to some of the exhibitions of this law, and their application to useful purposes.

"In reference to seeds, it has been long known to gardeners, that those which are new or fresh produce plants with more luxuriant foliage, and less inclined to run into flower and fruit than such as have been kept for some time, and are partially spoiled. In the first case, the supply of nourishment, during the early stages of its growth being in abundance, the plant enlarges rapidly in *size*; while, in the latter case, the scanty supply causes the plant, in obedience to the law which we have announced, to run more directly to flower and seed. These circumstances are carefully considered in the culture of cucumbers and melons, the seeds of which are seldom employed until several years old. Such, indeed, is the attention paid to this condition, that we find in books on horticulture the following grave recommendation:—'If new seed only can be had, it should be carried a week or two in the breeches pocket, to dry away some of the more watery parts.' A similar attention to this law, in reference to the seeds of other vegetables, is productive of equal benefit. Peas, for example, are well known as apt to run to straw, where the ground is rich or moist. The employment of old is the only suitable remedy. In some newly enclosed *carse-lands*, the evil of excessive luxuriance is frequently experienced to an inconvenient degree during two or three years. The straw is great in quantity, but the grain is always deficient. In vain is recourse had to early or thin sowing, while the use of old seed is neglected. We need not here guard against misconception, by stating in detail, that, where seeds are kept *too long*, they either do not vegetate, or give origin to a weak, sickly, useless plant. Where luxuriance of leaf and great size are the objects aimed at in the cultivation of farm or garden produce, the influence we have been considering must be guarded against as an evil; especially, for example, with turnips and cabbage; old seed producing plants too much disposed to run to flower.

"Independent of the influence which this law exercises on the future plant, as the result of the condition of the seed, we have it in our power to witness its operation under other circumstances, in the *growing plant* itself. In the management of *fruit trees*, there are a variety of plans pursued, which, though obviously depending on this *law* of the vegetable kingdom, are frequently but imperfectly understood by the practical gardener. The *transplanting* of fruit-trees hastens the production of flower buds. A tree which for years has shown no tendency to produce flower-buds, but which has been exclusively occupied in the extension of its roots and branches, will, upon being shifted from its place, soon exhibit symptoms of a change. The roots, by this process, have been in part injured, the supply of sap to the tree during the following season has in consequence become diminished, and the plant ceasing in a great measure to extend its size, hastens to propagate its kind by the production of flower buds, and the subsequent display of blossoms and fruit.

"The diminished supply of sap, and the consequent hastening of the production of fruit-buds, is accomplished by several other plans equally efficacious.

When a rank growing fruit-tree is engrafted on a slow growing stock, or, in other words, when a tree requiring much sap is compelled to receive its supply through a tree having but a scanty supply, the engrafted branch will come earlier into fruit than if it had been always supplied with abundant nourishment. This method of accelerating the production of fruit, and termed *dwarfing*, is peculiarly serviceable in enabling the cultivator of new varieties to become early acquainted with their respective merits.

"When fruit trees are prone to run to wood, gardeners are accustomed to lay bare a portion of their roots during winter. By this exposure many of the fibres are destroyed, and the vigor of all greatly diminished; so that the sap, during the following summer, is transmitted to the branches in less quantity, and the production of fruit buds is the consequence.

"Fruit trees luxuriant in leaves and branches, but bad bearers, are sometimes forced into a productive state, by having portions of the bark removed by the knife, or wires twisted round the stem or the branches. In this case, the ascent of the sap is indirectly diminished by the obstruction of the vessels containing the proper juices, the death of the plant, or portion of the plant is threatened, and the reproductive organs speedily exercise their functions. The late Dr. Walker, Professor of Natural History in the University of Edinburgh, who had devoted much time to the investigation of vegetable physiology, intimates that the effects here produced by barking, or the twisting of wires, have been accomplished by other means. He says (in his Economical History of the Hebrides, ii. p. 298,) 'to some standard fruit trees, *honeysuckle* indeed may be applied with great advantage; these, when even of considerable age, do sometimes continue to run so much to wood, and especially towards the heart of the tree, that it remains quite unfruitful. To plant a vigorous honeysuckle at the foot of such a tree, is an easy, effectual remedy, and much better than any pruning. The honeysuckle grows up, occupies the heart of the tree, checks its luxuriance, directs its vegetation towards the extremities, and renders it fruitful. A large apple tree of the above description, above fifty years old, and which had always been barren, was rendered by this practice extremely fruitful. When this end is answered, which will happen in a few years, the honeysuckle should then be removed, before it becomes injurious.'

In the cultivation of *flowering plants*, a knowledge of this law of vegetable life, and its extensive application, may prove of great importance. Sir James Edward Smith, in his Introduction to Botany, mentions that the Solandra grandiflora, a Jamaica shrub, was for a number of years cultivated in the English stoves, and propagated extensively by cuttings, each plant growing many feet in length every season, from the abundance of moisture and nourishment, without showing any signs of fructification. At length a pot of the Solandra was accidentally left without water in the dry stove at Kew; and, in consequence of this *unintentional* neglect, the luxuriant growth of its branches was greatly checked, and a flower came forth at the extremity of each. By a similar mode of treatment the same effect has since been frequently produced. Indeed, when the law is once properly understood, its application to a variety of cultivated plants, which are slow in showing flower, must be obvious. We have seen it practised with effect on several species of willows.

"In the cultivation of a farm, numerous examples are frequently occurring of the influence of this arrangement in the vegetable economy. The crops growing on the thinnest parts of the soil, where the nourishment is consequently in diminished quantity, are always the first to exhibit their flowers, and to be ready for the sickle. In ill managed farms, the harvest is usually much earlier (other things being equal,) than in those where the crops are under the influence of a better system. We have had an opportunity of witnessing the delay of harvest upon the application of lime for example, in consequence of this increased supply of nourishment producing luxuriance of growth rather than early flowering.

"In the management of *plantations*, the indications of this law may often prove of great value. Wherever we see a tree, in a very young state, exhibiting its flowers and producing fruit, we may anticipate its early decay. The premature formation of fruit-buds is the consequence of a scanty supply of nourishment, arising, it may be, from the roots having been injured, but generally from the plant being placed in an unfavorable soil. Fir trees readily indicate their disagreement with the soil by the production of cones, while yet young, and this early fructification is the almost sure forerunner of death. The Balsam Fir, for example, which thrives well on a moist soil, will, if planted on a thin, dry soil, begin in a few years, to produce cones—then the bark appears covered with blisters, which, when opened, pour forth a limpid resin, and the tree, after languishing a few years, dies, after, in the course of a dozen years, having attained the height of from 12 to 20 feet. In looking at those decorated villas, near a large town, which to the citizen appear so captivating, one may frequently discover the real character of the soil, by this premature flowering of the ornamental shrubbery.

"Though plants differ from animals, in reference to this singular law, which we have here ventured to establish from an extensive induction of particulars, they agree, in other respects, in the influence which an abundant supply of nourishment exercises in the increase of the number and size of the progeny."

To me it appears that smut in grain arises from a *modification* of the law now mentioned. In proof of this, I beg leave to recall your attention to my first paper on smut. It appeared in the first volume of your Magazine, at page 450.

If you attend to the facts stated in that paper, you will find many of them which coincide with Mr. Fleming's observations. To show this in a clearer point of view, I shall place a few of them in opposition to each other.

1st.

In my paper it will be found among the statement of facts, that "*smutted plants produce* ADDITIONAL LEAVES."

1st.

Mr. Fleming says, "it is well known that in the animal kingdom, all those circumstances which accelerate the growth of the body, exercise a proportional influence on the reproductive system. But the very reverse of this arrangement seems to prevail in the vegetable kingdom. In some newly improved course lands, the evil of excessive luxuriance is frequently experienced; the *straw* is great in quantity, but the grain is always deficient.

"When fruit trees are prone to *run to wood*, gardeners are accustomed to lay bare a portion of their roots during winter. By this exposure many of the fibres are destroyed, and the vigor of all greatly diminished; the production of fruit buds is the consequence.

2d.

"Farmers inform us that *new seed* is more apt than *old* to produce smut, and I stated in the paper above referred to, that appearances of luxuriant vegetation which are presented to our view in the *stems*, may also be traced to the *flowers*; that if we remove the corolla, and look into the interior of the flower, a *stem*, somewhat pellucid, and of a greenish colour,* will frequently be found growing up in room of the stamins and pistils."

2d.

Mr. F. says, "In reference to SEEDS it has been long known to gardeners that those which are new or fresh, produce plants with more luxuriant foliage, and less inclined to run into flower and fruit than such as have been kept for some time and are partially spoiled."

Having compared these statements, I would now ask what is the greenish coloured stem in the middle of the flower of smutted grain but an *indication of the flower running to wood?* What is this but the law stated by Mr. Fleming, or rather a modification of it? Mr. Fleming has remarked that an additional supply of moisture causes the *flower* to run to *wood*. This is just what I have stated with regard to smut. If you refer to my former papers you will find it stated that this effect (the running of the flower to wood) is produced by new seed and an additional supply of nourishment, arising from a separation of the coronal and seminal roots, and that this separation is occasioned by imperfect tillage.

I have thus endeavored to point out a few passages in which there appears to me to be some remarkable coincidences between the facts stated in my paper on smut, and those which are contained in Mr. Fleming's remarks. I have for a long time supposed that it is a law somewhat similar to the one stated by Mr. Fleming that produces smut, and as Mr. Fleming has given a very clear and perspicuous account of it, I have transcribed the whole of his paper. Without endeavoring, however, to arrive at a correct conclusion on this subject, I shall leave the matter to the determination of the readers of your Magazine, in the hope that some of them may tell us in what other points the coincidences above stated exist, or if these coincidences be merely adventitious.

JOHN LAWSON, JUN.

Elgin, Nov. 27, 1828.

* In a diseased *barley* plant, the pistils are frequently elevated on a *green stem*, resembling the common stem or culm of the plant.

[By the following, it will be perceived that the Inspecting Committee of the Hor. Society have resumed their labours. The display of flowers and fruit so far, augurs well for that emulation, which we hope will make the exhibitions of this season to surpass those of any preceding one. The improvement adopted in the manner of exhibiting the specimens, cannot but be highly satisfactory and pleasing, both to the gardener and amateur; and we truly hope it is only the prelude to that renovation and exhibition of energy, which will make the Society the pride and ornament of our country.]

ART. 72.—*Proceedings of the Inspecting Committee of the New-York Horticultural Society.*

March 31, 1829.—Mr. Neale presented a Hyacinth, called De Grand Enquirer white spike very close, the bells large and crowded, odor very fragrant, 5 inches in length and 3 in diameter; also, a Persian white Cyclamen, and a Hepatica, or Liverwort, double and blue.

April 14.—Seeds presented by Mr. Poinsett were distributed. Mr. Floy presented a specimen of the Calceolaria corymbosa, or Slipperwort, being the first time that plant has flowered in America; also, a Primula cortusoides, a hardy perennial; Mr. Neale, four fine Hyacinths, a double Pink, (Grootvorst) double white, do. blue, (Martinet) do. pale blue. (Pasquin) Mr. Wilson, a fine seedling Polyanthus.

May 5.—Mr. Neale exhibited 12 kinds of early Tulips; 10 sorts of early seedlings do.

Mr. A. Smith, Sea Kale, blanched 14 inches.

Mr. Cooke, 5 kinds of Hyacinths; Mr. Still, a fine Polyanthus; Com. Chauncey, by his gardener, Thomas Coady, 3 Cucumbers, raised on his place at Brooklyn, from seed procured from S. America.

May 12.—Mr. Cooke 16 kinds of Hyacinths, a double flowering Apple, and a Jonquil; Mr. Neale, six sorts of Hyacinths, a double early Tulip, 2 seedling Auriculas, having a blue deep color, a white eye and 6 pips, and 1 do. dark chocolate, white eye and 3 pips; Mr. Combault, 4 Tulips, raised in pots.

Seeds of the Beta cicla, a new variety, received from Robert Schomberg, of Richmond, Virginia, were received and distributed.

May 19.—Mr. Neale presented 50 varieties of Tulips, very beautiful; also, a specimen of Auricula, of the variety of "Chilcot's brilliant," with 3 pips; Mr. Still, from Mr. Fisher's garden, 2 good sorts of Tulips; Mr. Oakley, 10 varieties of fine Tulips from his garden; Mr. Combault, 5 varieties of Tulips. Mr. Still also presented 4 handsome specimens of white Dutch Lettuce, and 4 fine specimens of yellow Silesia Lettuce; Mr. Cooke, a double Jonquil, Parrot Tulip, a single white Hyacinth, a Convallaria majalis, (Lilly of the Valley) and a double flowering Almond.

May 26.—Mr. Wilson presented some Strawberries, a yellow Austrian Rose, several varieties of Scotch and other Roses, Honeysuckles, single Roses, Persian Lilacs, double Columbine, Ranunculus, Anchusa, and Scotch Broom.

Mr. Hogg, seven different species of Iris, Calla Ethiopica, single Pæonia Siberica, Pittosporum chinense, Geranium micranthenum, double white Scotch Rose, Metrosideros lanceolatus, Ixia crocata, Melaleuca, Acacia pulchella, and a double Cucubalus.

Mr. Floy, Epidendrum (air plant) in flower; Papaver bracteatum (8 1-2 inches in diameter); Mr. Warner, specimens of Apricots, (4 and 3 1-2 inches in circumference;) Mr. Oakley, a branch of Apricot Tree, 13 inches in length, and containing 28 young Apricots; Mr. Neale, 12 varieties of Tulips; Mr. Warner, also, a double flowering Cherry, very luxuriant; Mr. John Curr, 4 heads of Hybrid Cabbage, weighing 6 lbs. 11 oz.

Seeds received from Mr. Loudon, and from Mexico, were distributed.

ART. 73.—*Arborescent Cabbage Plant.—Extract of a letter, from* JAMES MEASE *M.D. of the Pennsylvania Hor. Society, to Dr. S. L. Mitchill, dated Philadelphia, May* 22, 1829.

A very valuable present has been recently made to his adopted country, by Mr. Elias Durand, an apothecary of Philadelphia, of two pounds of cabbage seed. This cabbage is extensively cultivated in his native province of France, as food for man and cattle. It is the *Brassica oleracea arborescens*, which you will find mentioned in the London Gardener's Magazine, Nos. xi. and xviii. a work by the way, which, for its uncommon merit, ought to be read by every cultivator of the earth, in the United States. It is there stated, that the stalk grows ten and twelve feet high in France, and in the Island of Jersey, and that it lasts four years. M. Durand says that he has seen it five feet high, but as the land in the provinces to which he refers, (Maine and Brittanny,) is known to be poor, it is probable that the greater height which the plant is said to attain, may be the result of its growing in a richer soil. The cabbages are left out all winter, and in the following year the leaves are pulled as wanted; but five or six must be left on the top. In the autumn, the young sprouts which succeed the detached leaves are only used, and when boiled are said to be equal to Brussels sprouts or brocoli.—The leaves are given to cows and other cattle, and also used in soup. A French gardener, to whom I gave some of the seed, says he knows the cabbage well—that the leaves are too coriaceous to eat; but M. Durand says, that when touched by the frost, they are excellent. The poor people in France, however, whose taste is not so refined as that of the *bon gens*, find no difficulty of eating the leaves when boiled. I fear the great cold of our winters, in the middle and northern States, will be too severe to permit these cabbages remaining in the ground four years without being protected, but they are worth the trouble of this protection, which might be easily afforded, at least on a small scale, by corn stalks planted thickly around them, and covering them on the top by a sheaf of straw. In the southern states, where the cultivation of artificial grasses is very little attended to, these cabbages appear to promise the most extensive benefits, and I have distributed the seeds largely, to my friends south of the Delaware. Mr. Durand presented the whole parcel, which he imported, to the Horticultural Society of Pennsylvania, and I hope to hear a favorable account of them next year. The Society deposited part of the seed with Mr. Landreth, at whose seed store, in Chesnut street, applicants may be gratuitously supplied with them. I have the pleasure to send you a parcel of them.

ART. 74.—*Comparative State of the Season.*

[From the New England Farmer.]

MR. EDITOR,—I have purposely delayed this accustomed publication, in order that it may be rendered

more complete. I have been induced to do it, because persons who keep no minutes have been led into the very erroneous opinion, that this season is late beyond any former example. I have more than once remarked in rendering these annual accounts, that the difference between what is called an early and late season is *practically* very small—that if vegetation is delayed, nature possesses powers to remedy the defects—that the difference between one season and another is every day diminishing as the season advances, and at the close of May there is rarely a difference of more than one or two days, between an early season and a late one. The disastrous season of 1816, which I have often remarked cost more to Massachusetts and Maine, than the whole expenses of the last war, is of course to be excepted. As the present season has been the object of special notice, I shall make my comparison more full and complete, at the risk of being deemed too minute. I repeat, what I have often said, that this is a comparison, not of my trees and plants with those of any *other* person, (for such a test would be of little value,) but of the same trees and plants in the same spot, throughout the whole period.

First cutting of a mess of asparagus, from the same bed, now 40 years old.

In 1815, May 6.	In 1823, May 5.
' 16, ' 5.	' 24, April 28.
' 17, ' 5.	' 25, ' 20.
' 20, ' 1.	' 28, ' 26.
' 21, ' 9.	' 29, May 1.
' 22, ' 1.	

So that the asparagus plant was rather more forward in this *abused* season than in the average of eleven years. It is difficult to get rid of this natural proof, far stronger than the most retentive memories.

First opening of the blossom of the apricot.

In 1815, May 1.	In 1823, April 20.
' 16, April 29.	' 28, ' 20.
' 17, May 2.	' 29, May 3.
' 18, ' 9.	
' 19, ' 3.	
' 20, April 20.	
' 22, ' 21.	

The apricot was therefore more late than usual this year in opening its flowers, but not remarkably so.

First opening of the blossoms of the cherry.

In 1813, May 10.	In 1822, May 1.
' 15, ' 10.	' 23, ' 7.
' 16, ' 6.	' 24, ' 1.
' 17, ' 6.	' 25, April 26.
' 18, ' 17.	' 26, May 4.
	' 27, April 21.
	' 29, May 9.

It will be seen that cherries were not this year more backward than usual.

First opening of the pear blossoms.

In 1813, May 20.	In 1820, May 13.
' 16, ' 12.	' 22, ' 5.
' 17, ' 7.	' 24, ' 4.
' 18, ' 24.	' 25, April 30.
' 19, ' 17.	' 26, May 5.
	' 28, ' 4.
	' 29, ' 14.

First opening of the apple blossoms.

In 1813, May 23.	In 1821, May 17.
' 16, ' 16.	' 22, ' 9.
' 17, ' 12.	' 23, ' 19.
' 18, ' 25.	' 24, ' 11.
' 19, ' 20.	' 25, ' 8.
' 20, ' 11.	' 26, ' 11.
	' 29, ' 15.

It will be thus seen that the lateness of the spring had very little effect upon the apple tree, and that the present season as to that tree must be classed among the early ones.

GENERAL REMARKS.—The peach tree has suffered extremely from Massachusetts to New Jersey. In the latter State an intelligent cultivator has lost a crop for which he was offered 4000 dollars. It has been as fatal to the vine, where it was left exposed. The promise of the pear tree is smaller than usual, and in some estates it has failed almost wholly.—The promise of the apple is not great, though it is too early to decide with confidence. Grass has set well, and the prospect of a very abundant crop, must be taken as an offset to the deficiency of fruit. The promise of cherries is a fair one.

Roxbury, May 17, 1829. J. LOWELL.

NEW YORK, MAY 31, 1829.

Making Butter in Winter.—A writer in the American Farmer, asserts that the quality of butter is injured in proportion to the time which the cream takes to rise; and that cream which has been long rising, requires more labor and time in churning. To expedite the rise of the cream, the vessels containing the milk should be kept in warm water of uniform temperature. Cream obtained in this way produces sweeter butter, and requires, in the operation of churning, never more than twenty-five minutes.

The object of setting pans of milk in cool water, in summer, is to prevent the milk from becoming sour, and afford the cream a longer time to rise.

Strawberries.—This delicious fruit was carried about the streets of New York on the 30th inst.

Charcoal dust, a Top Dressing for Onions.—A writer, in the Transactions of the Lon. Hor. So. has

applied dry charcoal dust to prevent the injury of grubs to onions. The coal is spread on the bed about half inch thick, and then mixed with the soil. It also prevents clubbing in cabbages.

Composition for Grafting.—Three parts of rosin; three of bees' wax; one of tallow. Melted and mixed while hot.

Transplanting Cedars.—About the year 1820, in the month of February, *when there was no frost in the ground*, I took up about eighty *small* cedars, retaining a small ball of earth about each, and planted them for a hedge. More than seventy of them are now living, and form a pretty close hedge, which has been trimmed to about breast high for several years.—*American Farmer.*

Planting Machine.—A very useful machine for Planting Corn, Cotton, Beans, and other seeds that are now planted in rows or drills, has lately been invented by Messrs. H. & Levi Robbins, Jr. of Denmark, Lewis Co. N. Y. This machine, weighing only 14 lbs. and in the form of a small Wheel Barrow, is pushed over the ground by one man at the rate of ten acres per day, dropping the grain of equal depth, and greater precision than in the common mode of planting. The cost does not exceed five dollars for each machine, and including the patent right, is sold for ten dollars. This machine is highly recommended by farmer swho have used it; also by the Pennsylvania Horticultural Society.

Extraordinary Rose Bush.—One of the most beautiful flowering productions; on which we have laid our eyes, is a red monthly rose, *Rosa semperflorens*, in the garden of J. N. Wells, Esq, of this city. The shrub is about 4 feet high, and although it stood in the open air all winter is thrifty in the highest degree, and every branch is literally covered with the most beautiful flowers.

Oneida Institute of Science and Industry.—A committee of the Regents of the University of which J. Buel, esq. was chairman, have recently made a report recommending that the petition of the Trustees of the above institute for incorporation, be granted. The Committee say in their report;

"That it appears from the memorial of the petitioners, and the affidavits accompanying the same, that a public school, intended to combine horticulture, husbandry and the mechanic arts with literature, has been founded in Oneida co. by the spirited exertions and liberal donations of an association of gentlemen; that more than $3000 has been received in subscriptions and donations, and expended in the purchase of a farm, erecting suitable buildings, and in procuring stock, implements, furniture, a library, &c.; that the said school has been in operation for nearly two years, and affords hopes of becoming eminently useful. The applicants pray to be incorporated, in order to entitle them to a distributive share of the literature fund.

"The plan of education devised for this school, meets the decided approbation of the committee; and if judiciously put into practice, cannot fail, in their opinion, of realizing the high expectations of its liberal benefactors.

"Among the advantages which this plan offers over that of ordinary academic schools, may be enumerated the following:

By enabling the pupil to defray the principal portion of the expense of his education by his labor, it renders the advantages of the school accessible to the indigent classes of society.

"By alternating labor with study, physical and intellectual health and vigor are promoted, and the habits of application and industry established.

"By blending practice with principles, in a business which is to constitute an employment for life, new interests and new ardor are imparted to both: and the irksomeness of study is transformed into an instructive recreation.

"By diffusing, in the departments of productive labor, the elemental principles of the sciences upon which their successful operations are based, new facilities are given to improvement in the useful arts.

"And it forms no inconsiderable recommendation to the consideration of the regents, who are constituted the guardians of the higher branches of education, that this plan of instruction is calculated specially to improve the knowledge, and elevate the character of that class of our fellow citizens whose industry constitutes the main sources of our wealth, and whose numbers give tone and character to our political and social institutions.

"From these views of the subject submitted to their consideration, the committee deem the institution particularly worthy the fostering care of the Regents of the University, and respectfully recommend that a charter be granted, in accordance with the prayer of the memorial.

A true copy, G. Hawley, Sec'y.

Albany, April, 1829.

For additional information, in relation to this Institute, see N. York Farmer, vol. 1st, art. 152. page 240.

Florida, Montgomery Co. N. Y. May, 1829.

The Vine.—I should be very glad to see the Grape Vine cultivated in my neighborhood. I live in a fertile district of country, where wheat and Indian corn are raised with the utmost ease, and where the native Grape grows luxuriantly, and in abundance. But I conclude that it requires particular skill to plant a Vineyard, and manage it successfully.

To any person, therefore, possessed of the requisite skill, and willing to settle here, I will *give* the use of an acre of my best land for twenty years, and, if wanted, a convenient dwelling-house, at a small rent.

Any person wishing further information, will please to call upon, or write to

Your most obedient, &c.

Editor of N. Y. Farmer. S. REYNOLDS.

Double Flowering Apple Tree.—It is remarkable, that although the Peach-tree and the Cherry-tree frequently multiply their petals so as to produce what are commonly called double blossoms, this occurrence is by no means so common with the Apple-tree.

An elegant specimen was produced before the N. York Horticultural Society. It was a small bough, almost covered with very beautiful flowers. It was said to have been procured from the garden of the late George Warner, near the junction of the Bowery with the Third Avenue. The tree was probably sixteen or eighteen years old, and perhaps twenty feet high, with boughs handsomely spreading around. It may be observed, without exaggeration, to have been, during the season of its inflorescence, one of the most beautiful objects of the kind, that the county contained. As it stood in plain view from the street, many passengers stopped to admire it; and the politeness of the family was extended to all persons who wished to enter the garden, for the purpose of a nearer inspection. It will probably appear to greater advantage, the next Spring.

Ed. of N. Y. Farmer. S. L. M.

New Material for Cordage.—Mr. Perrine, Consul of our United States at Campeachy, forwarded to Dr. Mitchill, a short time since, a very strong and excellent material for the manufacture of ropes and lines. It has very much the appearance, when dressed and prepared, of the article from the Philippine Islands, called *Manilla Hemp.* In order to make the communication more interesting, this gentleman sent along a box of earth, containing several fresh plants of the species, for cultivation and botanical research. It is to be regretted, however, that they were, every one, killed by the frost which the Ship encountered, on approaching the port of New-York. Together with these, arrived three full grown plants, that had been grubbed up as dead samples, for experiments. These were distributed to proper individuals, for improvement. The filamentous or fibrous matter is obtained from the long and bulky leaves by maceration, or soaking in water; and sold, when clean and dry, for two hundred and fifty dollars the ton.

Ed. of N. Y. Farmer. L.

Everlasting Potato.—An enquiry was made in a former Number of the Gardener's Magazine, (Vol. III. p. 379) about this root. I received a few tubers under this name, from Mr. Donaston, of West Felton. They seem to make no show of leafage above ground, and are of a small size, and thinly sprinkled under ground. They seem always ready to afford a supply of early potatoes, from one end of the year to the other; they are left undisturbed, except when a dish is wanted; they are not deeply embedded, but soon discovered on stirring the surface mould. (*July*, 1828.) Since I wrote you concerning what has been called the "everlasting potato," I have witnessed their being cultivated by a gentleman who is plentifully supplied with fine early potatoes about Christmas. The flower seems somewhat different from that of the common potato; those I witnessed in blossom on the 28th last month, (July) had been suffered to remain undisturbed from last year. I was informed that the potatoes were planted about the latter end of May; for, if planted sooner, they come in too early. Before frost sets in, the bed is covered with litter as a protection from its influence. They are taken up at Christmas, as fine new potatoes, and are either suffered to remain undisturbed, or perhaps, what is still better, the potatoes are completely forked up as they are wanted, and the smallest being separated, are set apart for seed, under a heap, or hillock, to be replanted towards the close of the succeeding May. The smallest sprigs of this potato will grow.—*J. Murray, Inverness, August*, 1828.

Cobbett's Corn.—Mr. Cobbett is by no means the first who has succeeded in raising the Indian Corn in Great Britain. Several years ago, I witnessed in the garden of Mr. William Stickny, of Ridgmont, in Holderness, plants of Indian corn reared from seeds of his own sowing, matured the preceding season in the open air. I remember to have been informed of a species of Indian corn sown as a successive crop in the Neapolitan territory, after the wheat had been reaped, called "Melica quarantina," or Forty Days' Indian Corn, so termed in virtue of the extraordinary rapidity of its growth and maturation. Indian corn is there used, with extraordinary success, in the fattening of pigs, and has proved equally efficient in this country. The British farmer will scarce venture his capital on so fragile a basis as the cultivation of Indian corn. Now and then a favorable season may present itself; but, like "angel visits," these periodic returns "will be few and far between." It is vaunted that the leaves may be manufactured into paper; but what is there, now-a-days, that has not been converted into what is called "paper." The leaves and stems of the hollyhock and potato, straw, and sawdust, &c.—*J. Murray.*

Mildew curable.—In Vol. IV. p. 281, there is an extract from Dr. Greville's *Flora Edinensis*, concerning mildew, of which it is stated, that, "As its production is probably the result of a peculiar state of the atmosphere, there is little chance of any means being discovered for its prevention." This should not be allowed to pass unnoticed in the Gardener's Magazine, because it is well known to every one acquainted with practical gardening, that soap suds, applied in time, will prevent the attack, and, after the attack, will speedily banish the pest.—*M.*

Agricultural Prospects.—It has been remarked, that winters of deep snow are followed by rich harvests. The vernal cold by checking the premature advance of vegetation, cheerless as it is in passing, is said to contribute to the abundance of the fruits of the earth. With these coinciding, incidents, the wise, about weather, predict unusual fertility, and other symptoms favor the belief that the plenty of former years will be renewed. The grasses are thick set and of intense verdure. Winter grains have a fair appearance. The backwardness of the spring has retarded the usual operations of the farmer, and cold and wet prevented the early preparation of the ground for planting. The fruit buds of the peach are few; but with this delicate tree it may often be noticed that the exuberance of blossoms is no certain indication of the abundance of autumnal products, and that when its branches are most thickly covered with flowers much of the fruit falls immature. The pear and apple are full of buds, and promise to fill the basket and barrel to overflowing.—*Na. Agis.*

[We are informed that the prospect of fruit, particularly peaches, in the vicinity of New-York, is favorable. Cider apples in N. Jersey, however, will not be abundant.—*Ed.*]

Grafting and Inoculation.—It is not unreasonable to suppose the benefits to be derived from engrafting and inoculation of fruit trees, are far from being fully realized. Aside from the neglect of improving orchards, where there is nothing to prevent but the disposition to procrastinate and delay—so prevalent with all—we believe that the process is of much more extensive application than is generally known, and that it may be the means of introducing the cultivation of fruits, now imported from abroad at a great expense. It has been ascertained that the shag-bark walnut may be successfully engrafted, and that the engrafted trees are much the surest bearers. Where this is not the case, the difference in the quality of these nuts would make it an object to engraft most of the walnut trees.—Some have a very thin shell, and a thick large meat—while others have a thick shell and but little meat. It is probable that the hickory or shag-bark, would do well, engrafted on the pig-nut. If it should, the quantity raised might be greatly increased, and the quality much improved.

The Madeira nut, which is usually sold at the shops under the name of the English walnut, at 12 1-2 to 16 cents per pound, may be cultivated here without difficulty, and is very productive. In the vicinity of New York, there is a tree which has produced in a single year, as many as sold in the market for *two hundred dollars.* We have no doubt that it might be engrafted on the butter-nut, or the walnut, with perfect success. It is a tree of the same genus, and in its character bears a nearer resemblance to the butter-nut than many other trees do to those on which they are successfully engrafted. The experiment is worth trying, and, if successful, it would soon furnish us, at a cheap rate, with a good supply of that excellent nut, without waiting the more tardy process of rearing the tree.—*Mass. Spy.*

Rye Coffee.—One reason why this article is not more used is, that few know how to make it. We know a lady who after several vain attempts to suit herself with it, happened to recollect, that when rye is sown, the operation of heat and moisture cause what is called the *saccharine* fermentation to take place, by which sugar is formed; after which, the sprout immediately begins to show itself. She therefore kept her rye moist, and moderately warm, till the swelling of the sprout showed that the fermentation had begun, and then dried and burnt it with all possible despatch, in order to arrest the process before the rye should become sour. Her success was complete, and her knowledge of chemistry was of use to her husband's pocket.—*Maine Farmer.*

To prevent the annoyance of Flies.—Farmers might easily save the flesh of Horses and Cows, and confer a great kindness on their animals, in preventing the usual annoyance of *Flies*, by simply *oiling* the parts most exposed.—Flies will not alight a moment on the spot, over which an oiled sponge has been pressed. Probably either fish or flaxseed oil would answer; but what I have known used with success was the Tanner's oil. Every man who is compassionate to his beast, ought to know this simple remedy, and every Livery Stable, and Country Inn, ought to have a supply at hand for the use of travellers.—*Ibid.*

Mas. Horticultural Society.—At a special meeting of this Society, for the admission of members and other business, the following donations were received, and distributed among the members.

From Dr. S. L. Mitchell, of New York, a small package of seeds of ornamental flowers, shrubs, and fruits, recently received by him from Caraccas.

From Dr. Hosack, President of the New York Horticultural Society, a box of kitchen garden vegetable seeds, including twenty new varieties of peas, beans, and squashes, received by him from Mexico.

From Mr. Wm. Wilson, of New-York, a package of seeds of the large Apple Head Lettuce, (heads of which were exhibited in the New York markets last season, which weighed 4 lbs. 4 ozs. each)—the New York premium Lettuce, and some fine Green Fleshed Melons.

From Mr. E. Wight, of Dedham, scions of two varieties of fine native Apples, described by him in an accompanying letter as follows:

"No. 1. Scions from a very old tree, which still continues to bear fully every year—fruit of an enormous size—ripens in November—of a rich, mealy, mellowness—a good pie apple, and a great bearer.

"No. 2. Scions from the thin skin apple tree, so called—a young tree—bears a yellow apple of a very thin skin, and an excellent fruit for the table—ripens in October."

Communications were received and read, from John Prince, Esq. of Roxbury, and Gen. Armistead on engrafting the foreign Sweet Water Grapes into American stocks, which will be published in the next New England Farmer.—Likewise the Report of the Committee on Fruit Trees, Fruits, &c.

Votes of thanks to Dr. Hosack, and the other gentlemen, who presented the above articles to the Society were passed.

Pennsylvania Horticultural Society.—At the meeting held on the evening of April 4th, the Society was favored with two bottles of currant wine, made on Pont Reading Farm, in 1825, presented by Miss Humphreys. It was considered a very good wine but a little overcharged with sugar. A valuable communication was received from Edward H. Bonsall of Germantown, upon the best mode of ripening wine for use, in which both from theory and experience, he shows "that currant wine as strongly requires age, and is as certainly benefitted by it, as that made from the grape;" he adds, "In fact, as there is generally more saccharine matter in it, it must require a still longer period to complete the vinous process, which I consider is still going on until a wine which was at first comparatively sweet, has arrived nearly at a state of *dryness*. Evaporation and deposit will equally take place, and with the same beneficial tendency as in other wines." Regarding wines in general, he maintains the position, that there is a limit to their improvement, which is attained in much less time than is generally supposed, especially where wine has been kept in a suitable place for ripening.

A. Parker produced 12 varieties of daisies, not before exhibited. His collection of this flower is very extensive.

Messrs. Landreths brought forward:

Azalea indica, two sp: the flowers of the one large and single, of a fine scarlet; the other producing clusters of compound florets, the color light purple, assuming a darker shade by candle light.

This Azalea is a native of China. Another specimen is now in bloom at Mr. Hibbert's, Thirteenth street, near Lombard, by whom it was introduced.

Pœonia moutan, *v rosea* (Chinese tree Pœonia,) of this a beautiful specimen was exhibited, having on it a number of buds and full blown flowers; this plant withstands our winters unprotected, and would form a valuable acquisition to our city gardens. Messrs. L. have twelve varieties of superb Pœonias, in their collection, all hardy. A specimen of a beautiful Indigofera in full bloom—also, Ixia, Eupatorium, elegans, Amaryllis Johnsonii, large crimson flowers, with light colored longitudinal stripes; this sp. is considered one of the most splendid of the Amaryllis tribe—also, Rhododendron arboreu ulgida; this is thought to be one of the most magnificent plants yet introduced into this country; the flowers as in all Rhododendrons, are formed in clusters at the extremity of its branches—those on this plant were about the size of those of Rho. maximum—color, most brilliant crimson; this plant flowered two years since with Messrs. L., and was supposed to have been the first blooming in this country; it is a native of the mountains of Nepaul, in Indostan, and it is hoped may prove hardy enough to stand in the open air, in which case its value will be much enhanced to those who do not possess green-houses.—*Aurora.*

Oil of Maize or Indian Corn.—Extract of a letter from N. M. Wells, Esq. of Detroit, Michigan, to Samuel L. Mitchill, dated May 16, 1829.

[For the N. Y. Farmer and Hor. Repository.]

DEAR SIR,—I send you a small vial of oil of *Indian Corn.* It was obtained from the *mash* when fermented for distillation. From four bushels, two quarts have been obtained. It burns with a peculiar brilliancy. Those physicians who have given it to their patients, say it is as effectual and as mild as castor oil. The oil is separated or made to rise on the tub by a process discovered by accident, and is a secret which the individual who made the discovery, will not disclose. When the mash is made in the common way, no oil is separated; nor is so much spirit by some quarts to the bushel obtained. You would confer a favor by conveying to the individual, through me, some way to purify it and cleanse it from the taste of the corn, and the smell of the beer. Any information will be most thankfully received and communicated to the individual concerned.

Hemp Machine.—Hines and Bain's machine "is so constructed as to operate 112 times on every inch of the stem; and when running at full speed, rising of 200,000 flutes operate on hemp, or flax per minute, in sufficient force to crack and dislodge the stem, and at the same time, preserve the coat or fibre un-

impaired. When well tended it will break 300 pounds of hemp or flax in an hour." This machine has been tried in New York, Vermont, Ohio, &c., and according to the certificates published in the newspapers, is everywhere approved. The hemp or flax is broken by the machine, and if unrotted, the fibre is then immersed in water a few days, dried, and again run through the machine, which makes it fit for use.

The Hon. Samuel Lathrop, of West Springfield, in a communication in the N. E. Farmer, says, the hemp raised in his neighborhood, when *well dressed*, commands in market the highest price of the best Russian hemp—from $10 to $12 50 per hundred. He lets out his land upon shares, and in one instance, received more than 45 dollars an acre clear profit. The price of other agricultural products is so low, that he thinks it deserves the consideration of farmers in different parts of the country, whether their interest does not require them to turn a part of their land, and to apply a portion of their labor, to the cultivation of hemp. The hemp in West Springfield has hitherto been water rotted, and dressed by the brake and swingling board.--*Hamp. Gaz.*

A Remarkable Grape Vine, reared by that skilful Horticulturist, John Willis, Esq. Collector of the Port of Oxford.

On the 25th of March, 1822, I planted a small layer of the Jersey grape vine in my yard, of which, I intended to make an arbour, and produce delicious table fruit, as I had found the fruit fine, hangs long, and very desirable—the place is somewhat encumbered with about half a dozen valuable fruit trees, and the first two years the vine made very little growth; neither was there much notice taken of it; the third year it made a surprising growth, and took the attention of many strangers. I then tried the best skill I was master of to force and encourage the growth. The fourth year it so far excelled my most sanguine expectations, and began to smother a fine bearing pear tree, and appeared to threaten some more trees, that I pruned off of the south and east side of it about one hundred and sixty cuttings; and found it, in the fifth year to extend (where not close pruned,) each way, about thirty five feet or more; and last spring, it was so laden with fruit, that I was going to have the bunches counted, (as it is the bunch grape,) and they are of tolerable good size; but we were visited by several hail gusts, which destroyed so many of them that I declined having the balance counted. Now it is again well laden with fruit; and I have, this day, invited some of my neighbours together to come and count them, which could not be done, only, I have drawn lines through the vine in fourteen places, so that they may count between them—all double bunches are only counted as single ones; and you have their certificate at the bottom; and if you please, you may give it a place in your most valuable work. Now the grapes are out of all danger, (except hail gusts, &c. Those gentlemen know the planting and management of this vine. I only call it five years' growth, though planted seven. Now, how much do you suppose the Great Hampton Court Palace vine, planted in the reign of king William,* could have excelled this, at five years' growth?

To J. S. Skinner, Esq. JOHN WILLIS.

Oxford, May 23, 1829.

We the subscribers do hereby certify that we have this day counted the bunches of grapes on Mr. J. Willis's splendid vine, and find the number to be 13,315,† amongst which we suppose nearly half to be double, although counted as single. We further state that we have known said vine nearly from its planting, and can affirm the statement of Mr. Willis to be correct in every respect. We also took the circumference of the vine near the ground, which is only 7 1-4 inches.

THOMAS WATTS,
RICHARD MARKLAND,
JAMES STEWART, JUN.

Air essential for Fish.—When a free communication with the external air is prevented by ice, or by artifice, fishes immediately discover symptoms of uneasiness, and soon perish. Ælian informs us, that, in winter, when the river Ister was frozen, the fishers dug holes in the ice; that great numbers of fishes resorted to these holes; and that their eagerness was so great, that they allowed themselves to be seized by the hands of the fishermen. Rondeletius made many experiments on this subject. If, says he, fishes are put into a narrow-mouthed vessel filled with water, and a communication with the air be preserved, the animals live, and swim about, not for days and months only, but for several years. If the mouth of the vessel, however, be closely shut, either with the hand, or any other covering, that the passage of the air is excluded, the fishes suddenly die. Immediately after the mouth of the vessel is closed, the creatures rush tumultuously, one above another, to the top, contending which of them shall soonest receive the benefit of the air. In the shallow parts of rivers, when frozen, many fishes are found dead. But, when parts of a river are deep or rapid, the fishes fly from the ice, and by this means avoid destruction.

These, and similar experiments, have been repeated by Mr. Willoughby, and many other modern authors; and they have uniformly been attended with the same event. A carp, in a large vessel full of water, was

* See Cobbett on Forsyth, page 79.

† For the table about 440 bunches a day for thirty days from one vine!—*Ed. Am. Far.*

placed in the receiver of an air-pump. In proportion as the air was exhausted by working the pump, the surface of the animal's body was covered with a number of bubbles. The carp soon breathed quicker, and with more difficulty. A little after, it rose to the surface in quest of air. The bubbles on its surface next disappeared; the belly, which before was greatly swollen, suddenly collapsed; and the animal sunk to the bottom, and expired in convulsions.—*Smellie.*

Air Essential to Insects.—'Air is distributed in the bodies of Insects by a great number of tubes or canals called *tracheæ*, which convey it to every part. These communicate with the external air by means of openings called *stigmata*, which furnish a constant supply. That these organs are destined for the transmission of air, has been proved by repeated experiments; for when stopped up by the application of oil, or other unctuous substances, the animals soon lose their existence. In some insects they protrude externally to some distance from the body, and have the appearance of one, two, or three tails; and in others they arise from the back and sides.'—*Ibid.*

Improving the breed of Cattle.—Mr. Featherstonhaugh, a distinguished farmer, in the state of New-York, after a journey of fifteen hundred miles in the different states, for the purpose of viewing the imported cattle, and to examine the method after which their owners keep them, as well as the condition of our own native cattle, remarks, that in order to keep up the great qualities of the imported breeds, we must remember that in their native country it is considered indispensable to keep them extremely well, and in a very different manner from the general custom prevailing here; which is, in summer to leave cattle to help themselves to what they can find, even in the most severe drought; and in winter, to give them a moderate quantity of hay and straw. That in England, where they are less troubled with dry weather than we are, they give them green crops and roots in abundance, and that if all this provident attention be necessary in that moist climate, it is certain the breed will degenerate with us if it is not kept in high condition. He observed that he was convinced that negligence was the universal cause of diseases, and that they ordinarily arise from too high feeding or too low. In one case, the digestive powers are embarrassed, in the other they are not sufficiently exercised, and in both the animal suffers; that animals, regularly yet plentifully fed and well housed in winter, are generally healthy.

Loss of weight in drying Hay.—The time of cuting the several grasses, as in the following statement was the same as is usually practised by husbandmen in New-England.

Of 100 lbs. of vegetables cured in 1822, the product was as follows, viz.

100 lbs. of green white clover,	gave of hay,	17½ lbs.
110 lbs. of red	do. gave	27½
100 lbs. of herds grass	gave	40
100 lbs. of fresh meadow	gave	38
100 lbs. of salt grass	gave	39
100 lbs. of Mixed 2d crop or Eng. rowan		18½
100 lbs. of corn stalks	gave	25
100 lbs. of do. cut in milk with the ear		25

It should be observed that the weight will vary from ripeness, and many other causes, such as wetness of season, shade, thickness of growth, &c.

It appears from the above experiment, that eight hundred pounds of those vegetables on which we usually keep our cattle in the winter, there is a loss of five hundred and sixty-nine pounds and one quarter of their weight, by drying it for a state of preservation: and when we consider the great prevalence of water in the composition of vegetables, we are led to conclude that this loss consists of those substantial aliments which are essential to the support of animal life."—*Mass. Agri. Repository.*

Vinegar.—By a very strong pressure, a liquid is extracted from the murk of grapes which is a superior vinegar. To obtain it, the murk is first well aired and exposed until it sours.

Average price of Vegetables sold at Washington Market, for May 1829. [Corrected by WILLIAM CURR, Gardener. For the N. Y. Farmer.]

Cauliflower, from 12 1-2 to 25 cents per head.—*Early York Cabbage*, from 37 1-2 to 75 cents per doz.—*Brussels Sprouts*, from 37 1-2 to 50 cents per bushel.—*Spinach*, from 25 to 37 1-2 cents a bush.—*Cresses*, from 9 to 25 cents per half-peck.—*Parsley*, 3 cents per bunch.—*Leeks*, 12 1-2 cents per bunch.—*Asparagus*, from 6 to 18 cents per bunch.—*Rhubarb Leaves* from 4 to 8 cents per bunch.—*Shallots*, 6 cents per bunch.—*Salad*, from 12 1-2 to 18 cents per dozen heads.—*Chives*, from 8 to 10 cents per doz. bunches. *Young Onions*, at from 12 1-2 to 18 cents per dozen bunches.—*Radishes*, from 4 to 12 bunches for 12 1-2 cents.—*Corn-Salad*, from 12 1-2 to 15 cents a half-peck.—*Parsnips*, from $1 to 1 25 per hundred.—*Beets*, from $1 to 2 per hundred.—*Carrots*, from 75 cents to $1 per hundred.—*Turnips*, from 37 1-2 to 75 cents per bushel.—*Onions*, from 50 to 125 cents per bushel.—*Green Peas*, from $2 25 to 3 50 per bushel.—*Potatoes*, from 50 cents to $1 per bushel.—*Beet-Tops*, from 19 to 37 1-2 cents per bushel.—*Horse Radish*, 3 cents per bunch.—*Strawberries*, from 12 1-2 to 25 cents per basket.

REMARKS.—The quality of vegetables in market is very fine. The frequent showers and almost summer heat of the last weeks in this month, have rapidly advanced vegetation. The prospect for an abundant supply of culinary vegetables is very encouraging.